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ARMED FORCES CHEMICAL JOURNAL

No Steaming Needed

—in spite of 21 days of rugged winter!

Columbia Caustic Soda Tank Car Unloaded Without Difficulty

On January 28, 1948, a Columbia Caustic Soda tank car left Barberton, Ohio, consigned to a Massachusetts plant. Heavy snow storms side-tracked the car near Buffalo. Transit time for this haul, ordinarily three to four days, stretched out to twenty-one days.

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Delays of this duration are rare. The incident therefore provides unusual evidence of the highly efficient design and construction of these cars—particularly in respect to insulation—and the rigid inspection and attention given to loading temperatures.

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Armed Forces Chemical Journal

OFFICIAL PUBLICATION OF THE ARMED FORCES CHEMICAL ASSOCIATION
Room 523, 1129 Vermont Ave. N.W.
Washington 5, D. C.
LT. COL. HAROLD B. RODIER, *CmlC, Ret.*, Editor

Vol. III JANUARY, 1949 No. 3

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THE PICTURE ON THE COVER is a composite representing the many and varied activities carried on at the Army Chemical Center.

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". . . to sponsor new developments designed to increase the efficiency of chemical warfare means, to collect and disseminate useful knowledge with respect to chemical warfare and related subjects, to foster a spirit of good will and cooperative endeavor among its members and with industry, and to perpetuate the friendships, memories and traditions growing out of their service with the Chemical Corps . . ."

Armed Forces Chemical Association

COL. HARRY A. KUHN, USA, Ret., *President*
Washington, D. C.

FRED M. JACOBS, *Secretary-Treasurer*
Room 523, 1129 Vermont Avenue N.W.
Washington 5, D. C.

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Room 523, 1129 Vermont Avenue N.W.
Washington 5, D. C.

Associate Editor
COL. L. WILSON GREENE, *Cml. Res.*

Vol. III **January, 1949** **No. 3**

Swan Song

This is the last issue of the *Journal* which will be edited by the undersigned. After editing the magazine from its first issue he has been obliged to relinquish the post of Editor because of the press of other interests. He does so with a deep sense of regret, for the task has been of absorbing interest, and his association with the officers and members of the Armed Forces Chemical Association have been happy and satisfying. Herb Bear, Pete King and Harry Kuhn have been inspiring leaders to work for and with. The official staff of the Association are men with whom he is proud to have been associated. Your Editor has been able to observe and is glad of an opportunity to testify to the kind of service they have rendered your Association. Their talent, their energy and their time has been devoted to your interests to an extent far beyond the normal obligations of such offices. In the short span of life of our Association it has gained the outspoken respect of the other military-industrial organizations, and has achieved an important role in the National Defense program.

The issue of a speedy victory or a prolonged, world-consuming war *may* depend upon the speed of our *chemical* mobilization in an emergency.

The Armed Forces Chemical Association, which has kept together a great pool of chemical skills—military, industrial and scientific—can reasonably be credited with the capacity to speed up such a chemical mobilization—and if it advanced it by so much as one day it would be a vital and perhaps decisive contribution to victory.

In the face of this, who can, in good conscience, abstain from active participation in the Association?

The Editorship of the *Journal* will be assumed by Captain MacArthur H. Manchester, S. A. Res. We bespeak for him the same loyal and cordial cooperation from our members and from the Corps which has been accorded the retiring Editor.

HAROLD B. RODIER,
Lt. Col. CmlC, Ret.

From Your National President

The supplement to the Directory of Members which is issued with the *Journal* this month contains more than 550 names. These members are our growth since the Directory went to press in July, an increase of almost 20 percent. Today our members represent a composite pool of chemical warfare knowledge which is a valuable part of national defense planning. The Directory is the key to that knowledge of research, production, supply and training. The value of the Association increases with each new member—his address ties him to his old associates and his knowledge and experience gained in World War II becomes available in a future emergency. Our total membership is still small and I urge each chapter membership committee and each individual member to continue their drive to bring in new members. Each new member makes your own membership more valuable.

Maj. Gen. Waitt reiterated his views of the importance of the Association in a recent letter to the Association, which I quote in part:

"The Armed Forces Chemical Association has already proved its value to National Defense and to the Chemical Corps and is a strong force for rendering most useful service to the Corps and to the entire National Defense scheme. I stand squarely behind its objectives. Every Chemical Corps Officer of each of the components of the Army of the United States should be acquainted with the work of the Armed Forces Chemical Association and take an active interest in what it is doing.

"The *Armed Forces Chemical Journal* will assist greatly in keeping up with the progress in chemical warfare."

We have made substantial progress and with your active help we can double our membership and that is our goal.

HARRY A. KUHN,
Col., USA, Ret'd.

Boston Army-Industry Day

Top generals of the United States Army will meet in Boston on February 4, at the invitation of the military associations of the New England area, for an all-day conference with New England businessmen to give leaders in industry and the chiefs of the Army's technical services an opportunity to discuss mutual problems. It will mark the third annual observance of Industry-Army Day. Previous conferences have been held in Chicago and Dallas.

Meeting in Boston for this conference will be Gordon Gray, Assistant Secretary of the Army; General Omar N. Bradley, Army Chief of Staff; General J. Lawton Collins, vice Chief of Staff; Lt. Gen. R. A. Wheeler, Chief of Engineers; Maj. Gen. T. B. Larkin, Quartermaster General; Maj. Gen. Alden H. Waitt, Chief of the Chemical Corps; Maj. Gen. Frank A. Heileman, Chief of Transportation; Maj. Gen. Spencer B. Aken, Chief Signal Officer; and Maj. Gen. Everett S. Hughes, Chief of Ordnance.

The New England associations sponsoring the conference include the Boston Chapter, Society of American Military Engineers; Yankee Post, American Ordnance Association; New England Chapter, Army Transportation Association; Boston Chapter, Armed Forces Chemical Association; Boston Chapter, Armed Forces Communications Association; New England Chapter, Quartermaster Association.

Cooperating in sponsoring Industry-Army Day are the New England Council, the Associated Industries of Massachusetts, and the Boston Chamber of Commerce.

The activities of Industry-Army Day will begin at noon on February 4th with each of the six technical services holding a luncheon at nearby Boston hotels. The guest speakers at these luncheons will be the chiefs of the respective technical services of the Army. After the addresses, there will be question and answer periods for the exchange of ideas between the service chiefs and the industrial and business leaders attending the luncheons.

Later in the afternoon General Collins will discuss the world situation, using military maps, to bring the assembled audience up to date on world events. This conference will be held at the First Corps Cadet Armory in Boston. Secretary Gray will also take part in the discussion.

The highlight of the conference will be a banquet held in the main ballroom of the Hotel Statler in the evening, with General Bradley as the principal speaker. An invitation has been extended to Henry Ford II to participate in the speaking program as a representative of the industrialists of the country. Should Mr. Ford be unable to attend, a top industrialist from New England will be invited.

Heading up Army-Industry Day in Boston is Joseph P. Spang, Jr., President of Associated Industries of Massachusetts. Other leaders in industry on his committee are C. Lawrence Muench, president, Boston Chamber of Commerce; Joseph A. Erikson, president, Federal Reserve Bank; John A. Volpe, past president, Association of General Contractors; and Richard L. Bowditch, past president, New England Council.

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82 NEW MEMBERS FOR EDGEWOOD

During the special national membership campaign, Mr. Henry Fischer, chairman of the local membership committee, and Lt. Col. T. A. Carilia, member of the national membership committee are happy to state that as of 10 December, 82 new members have "joined-up." The members were obtained by the following:

Mr. Eugene W. Jay	36
Mr. Charles Blair	12
Mr. Fred Kileski	11
Mrs. Lois Cunningham	7
Mr. Henry Fischer	4
Mr. Lawrence Phelps	3
Lt. Col. William Greene	3
Lt. Col. T. A. Carilia	3
Mr. J. N. Bruce	1
Mr. Lawrence Burns	1
Mr. Edward Schwanke	1

WILSON GREENE ON STAFF OF NEW JOURNAL

L. Wilson Greene, Scientific Director of the Technical Command, has been asked to become a member of the abstracting staff of *Excerpta Medica*, a new international scientific abstract journal published in Amsterdam, Holland. Colonel Greene has been on the staff of *Chemical Abstracts* for more than ten years.

—U. S. Army Photograph

Effect of bombing raids, Ulm, Germany.

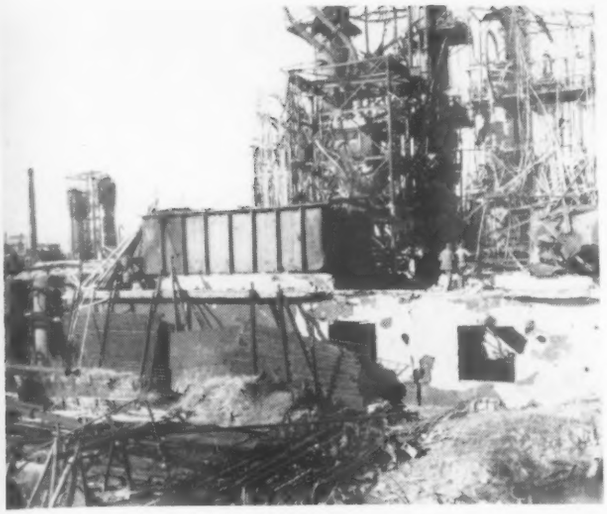
"If a thousand enemy bombers dropped full loads of modern chemical bombs on a major American industrial city unprepared for such an attack, the result would be death and injury to thousands of people."

—Civil Defense for National Security.

Civil Defense and the Association

Civil Defense planning was an important factor in Britain's ability to withstand the "blitz" raids and eventually emerge as one of the victors in the war. On the other hand, the lack of such preparation contributed materially to the defeat of the Axis. Civil defense may well be the deciding factor in winning or losing any future major war in which we are involved.

Prior to World War II England planned and organized her civil defense four years before it was used, and the people were conditioned for it and organized accordingly. On the other hand, Japan could not believe that attacks would reach her shores and accordingly was ill-prepared in Civil Defense procedures and facilities. Also Germany had only a partial conception of the needs of planned civil defense and consequently was hampered by administrative muddles.



—U. S. Strategic Bombing Survey Photo

B-29 bombing, Yokaiichi, Japan

England might have gone down to defeat had she not prepared and trained her people in advance so that they knew what to do and how to do it, when the enemy planes and buzz-bombs came over. Specialists who examined Hiroshima and Nagasaki report that thousands of people died who might have been saved had organized assistance, thoroughly trained and well equipped, been ready for action. German cities were evacuated with much confusion and difficulty. In ten days of air raids, Hamburg suffered 60,000 killed, 37,000 wounded and fires which swept beyond control of bungled civil defense. An organization to cope with disasters of this magnitude cannot be organized over night.

Colonel Kuhn discussed the report "Civil Defense for National Security" recently released by the Secretary of Defense and particularly the chemical defense aspects in a talk to the Cleveland Chapter on 10 December.

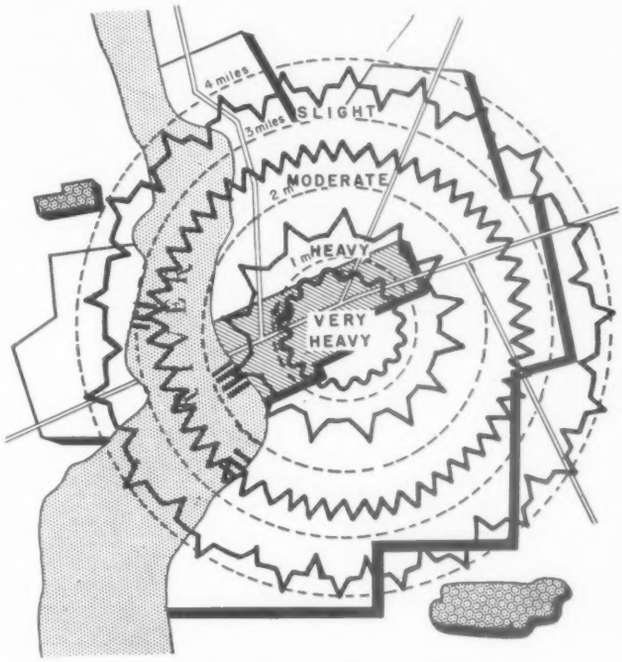
He pointed out that this plan visualizes the possibility of an attack on this country by bomber squadrons dropping atomic bombs, incendiaries, gas bombs or super-explosives on our industrial centers. Raids might came via guided missiles from distant points or from submarines off our shores. Attacks to hamper our industrial production might come from saboteurs and fifth columnists within our borders. However it came, it could mean devastation and death at many points on such a scale that the tasks of rescue and restoration would be far beyond the present capabilities of the people and communities attacked.

This plan takes full recognition of the potential devastation that would result from an enemy attack by chemical agents, incendiaries and biological weapons. It stresses the complexity of organizing for defense against these weapons because of the variety and deadliness of the chemicals which might be used, the speed with which they would take effect on people, the hazardous contamination of areas, buildings and objects which might persist after attack, and the training requirements in detection, first aid and treatment.

The Plan for Civil Defense provides for a central agency to report either to the secretary of defense or to another agency at cabinet level, a small regional coordinating staff parallel in area to the six service commands. However, prime responsibility rests on the state and city organizations, headed by the governors and mayors, respectively. These elected officials incorporate their civil defense organization with their related existing peacetime departments.

Chemical defense organizations are planned at all four levels—national, regional, state and city. A separate parallel organization is planned for biological warfare defenses. The training responsibilities of this chemical organization are tremendous and include defense measures for the individual for detection and for decontamination teams, and for the anti-chemical training of related services such as the fire fighting, police, engineering and public works. The supply functions of these organizations include storage, issue, requisitioning of supplies and equipment, and the maintenance and repair of chemical defense equipment.

Considerable research and development should be started at once on chemical defense equipment designed to meet civil defense characteristics



Estimated A-Bomb damage, typican American city
—Medical Report, Surgeon General, USA

rather than using equipment and supplies developed to meet military needs. For example, a converted military gas mask may be more expensive, use critical materials and not be as satisfactory as a gas mask designed specifically for civilian needs. Counterparts of some form of decontaminating equipment exists in every community so that the job will be one of conversion of existing laundries, garages, etc., to decontamination purposes. These problems need study now rather than after the need arises.

It is realized that in event of extensive bombing the local civil defense organization may suffer crippling casualties or the resultant damages be beyond their resources. To meet these emergencies Mobile Reserve Battalions are contemplated. Initially one hundred of these battalions would be organized, chiefly in or near key industrial centers. The Tables of Organization of these battalions require approximately 500 men and to each battalion will be attached a flight of six planes from the Civil Air Patrol. Each battalion will also include a chemical decontamination service.

The demand for personnel with knowledge of chemical warfare and chemical and biological agents to staff the initial organization is so large that it deserves the special consideration of every individual and chapter of the Armed Forces Chemical Association. This Association was consulted and actively represented in an advisory capacity in drafting the chemical defense section of this plan and will be the largest reservoir of key personnel if the plan becomes a part of our

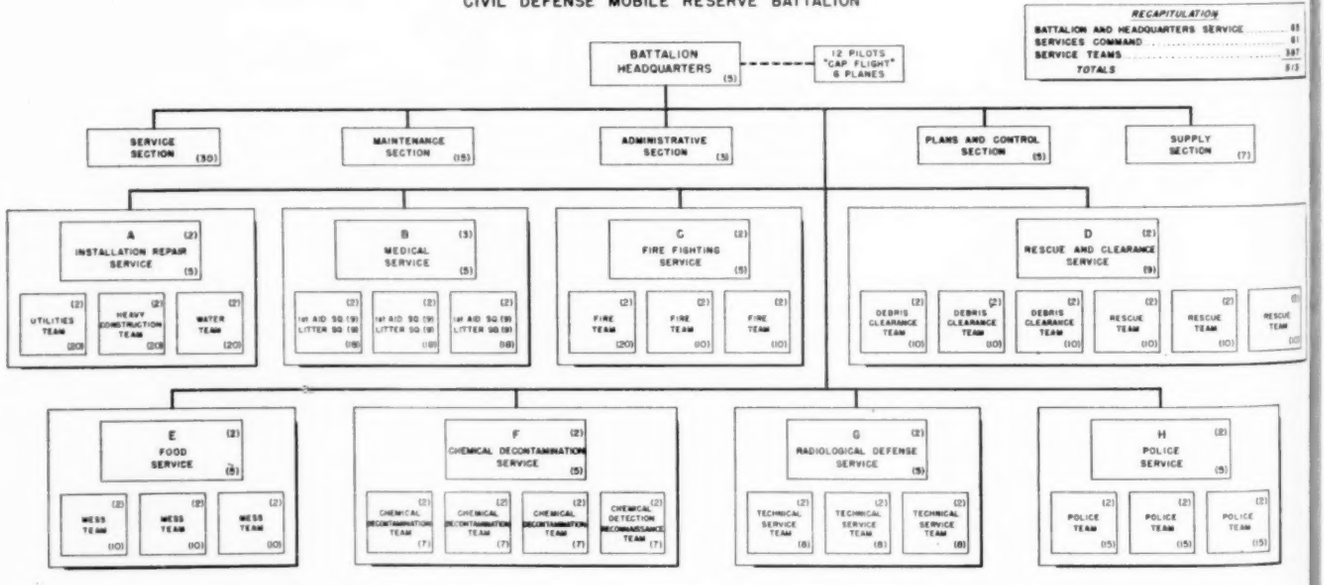
—U. S. Army Air Forces Photo

Effect of 8th Air Force attacks with explosives and incendiaries, Harburg, Germany.

national defense organization. Each chapter has been furnished a copy of the Plan and requested to study it particularly with reference to its local application. It was pointed out that this plan requires approval of the President as well as National and State Legislation before it is put into effect. Now is the time to recommend changes and amendments if any.

At this meeting of the Cleveland Chapter a committee was appointed to study the Plan and to report to the members any action deemed necessary. Now that the initiative has been taken by one chapter, all others should fall in line and establish committees in their areas.

PROPOSED ORGANIZATION FOR
CIVIL DEFENSE MOBILE RESERVE BATTALION


RECAPITULATION
BATTALION AND HEADQUARTERS SERVICE
SERVICES COMMAND
SERVICE TEAMS
TOTALS
BATTALION HEADQUARTERS (5)
12 PILOTS "CAP FLIGHT" 6 PLANES
SERVICE SECTION (30)
MAINTENANCE SECTION (15)
ADMINISTRATIVE SECTION (5)
PLANS AND CONTROL SECTION (5)
SUPPLY SECTION (7)
A (2) INSTALLATION REPAIR SERVICE (5)
UTILITIES TEAM (20)
HEAVY CONSTRUCTION TEAM (20)
WATER TEAM (20)
B (3) MEDICAL SERVICE (5)
1st AID SQ (9) LlitTER SQ (9) (18)
1st AID SQ (9) LITTER SQ (9) (18)
1st AID SQ (9) LITTER SQ (9) (18)
C (2) FIRE FIGHTING SERVICE (5)
FIRE TEAM (20)
FIRE TEAM (10)
FIRE TEAM (10)
D (2) RESCUE AND CLEARANCE SERVICE (9)
DEBRIS CLEARANCE TEAM (10)
DEBRIS CLEARANCE TEAM (10)
DEBRIS CLEARANCE TEAM (10)
RESCUE TEAM (10)
RESCUE TEAM (10)
RESCUE TEAM (10)
E (2) FOOD SERVICE (5)
MESS TEAM (10)
MESS TEAM (10)
MESS TEAM (10)
F (2) CHEMICAL DECONTAMINATION SERVICE (5)
CHEMICAL DECONTAMINATION TEAM (7)
CHEMICAL DECONTAMINATION TEAM (7)
CHEMICAL DECONTAMINATION TEAM (7)
CHEMICAL DETECTION RECONNAISSANCE TEAM (7)
G (2) RADIOLOGICAL DEFENSE SERVICE (5)
TECHNICAL SERVICE TEAM (8)
TECHNICAL SERVICE TEAM (8)
TECHNICAL SERVICE TEAM (8)
H (2) POLICE SERVICE (5)
POLICE TEAM (15)
POLICE TEAM (15)
POLICE TEAM (15)

Chemicals you live by ...

"Dog Able reporting..."

D. A.—Diamond Alkali—reports on its operation of the government-owned, chlorine-alkali plants at Edgewood, Md., and Pine Bluff, Ark. These two arsenals, built during the war to help meet the military requirements for chlorine and caustic soda, were leased to Diamond early in 1947. Since that time, Diamond has maintained the arsenals in good working order, and is adding 30% to Edgewood's capacity.

Under this arrangement, these productive facilities, vital to the Arsenal of Democracy, are instantly available for government use should the need arise. In the meantime, their continued operation is helping to alleviate serious peacetime shortages.

As a result of this policy, everyone benefits: the government arsenals are kept in efficient "stand-by" condition, industry is supplied with basic chemicals and the taxpayer is relieved of a housekeeping burden.

DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

Dr. Noyes Heads R and D Board Committee

Dr. W. Albert Noyes, Jr., Chairman of the Department of Chemistry at the University of Rochester, has recently resigned as Chairman of the Research Council of the Chemical Corps Advisory Board "because of the assumption of other duties."

Major General Alden H. Waitt, Chief of the Chemical Corps, in revealing Dr. Noyes' resignation, also announced the appointment of Dr. H. F. Johnstone, Professor of Chemical Engineering at the Univ. of Ill., as Committee Chairman.

Dr. Noyes' letter of resignation to General Waitt stated: "It has been a real pleasure to work for you and with you for the past several years and I would like to assure you that I will be glad to help the Chemical Corps at any time and in any way which the time at my disposal and my very limited abilities will permit. The Research Council has always felt that it has had your warm sympathy and your cooperation. It is with real regret that I step out of this official connection with you but as long as you are willing I will be happy to retain my appointment as a Consultant."

The "other duties" necessitating Dr. Noyes' resignation are those of Chairman of the Committee on Chemical Warfare of the Research and Development Board, National Military Establishment, a post to which he was recently appointed.

Born in Terre Haute, Indiana in 1898, Dr. Noyes studied and taught at Grinnell College, the University of Paris, the University of California, the University of Chicago, Brown University, and the University of Rochester until 1937, when he was appointed chairman of the Department of Chemistry at Rochester. He served in World War I as a Signal Corps Officer, and from 1936 to 1941 was a Lt. Commander in the U. S. Naval Reserve.

His invaluable contributions to the war effort during World War II are well known to the Chemical Corps and to the industry. As Chairman of Division 10, National Defense Research Committee, and as a member of the Chemical Corps-National Defense Research Council Technical Committee, Dr. Noyes was responsible for research and development activities ranging throughout the field of physical chemistry, and as a member of the Staff of the Chief, Technical Division of the Chemical Corps, he was exceptionally successful in integrating the effort in his field of investigation between the Corps and the NDRC. As Director of the Project Coordination Staff, a combined U. S., Canadian and British Advisory Staff, he was largely responsible for the successful coordination of the program of the three nations in testing and proving new and old chemical munitions and materiel.

DR. W. ALBERT NOYES, JR.
Dr. Noyes was presented with the Medal of Merit by General Waitt on January 7th, 1949.

Matters of Chemical Corps interest took Dr. Noyes into combat theaters on four different occasions during the war. In 1941 he spent six weeks in England under the auspices of the Office of Scientific Research and Development. In August, 1944, a special intelligence mission for G-2 took him to Paris, where he was one of the first Americans to enter the city after its liberation. In October, 1944, Dr. Noyes participated in the CWS Conference directed by CG, USA, SOS, Southwest Pacific Area, held at Oro Bay in Northwest New Guinea, and later visited Biak, Hollandia, Netherlands, New Guinea and many locations in Australia, as consultant and advisor to members of the Allied High Command on matters pertaining to Chemical Corps research.

(Continued on page 47)

The Air Chemical School

By Lt. Col. Clifford R. Opper, *U.S.A.F.*
Supervisor

At the beginning of World War II, the need for qualified Chemical Officers within the Air Forces was so great that many officers from the Army Chemical Corps were placed on duty with the Air Forces to assist in meeting the expanding requirements.

By 1943 a School was established at Barksdale Air Force Base, Louisiana, to provide the latest technical information on new chemical equipment and to give to its students a complete understanding of all phases of Chemical Corps activities peculiar to the Air Forces. During 1944, the School was moved to Buckley Air Force Base, Colorado. At this time the school was expanded to include the training of airmen for duty with the various air chemical companies and staff sections.

In March 1946, the Air Chemical School was moved from Buckley AFB to Lackland Air Force Base. Here, the first class of officers were mostly rated officers who had expressed a desire to take this technical training. The airmen who had chosen Air Chemical as their career were entered into one of three classes in accordance with individual qualifications. The courses available were the Toxic Gas Handler, 78601, the Decontamination Operator, 80901, or the Chemical Technician, 87001. In July of 1946 the School was moved to Keesler Air Force Base, Mississippi in accordance with the reorganization of the Air Training Command.

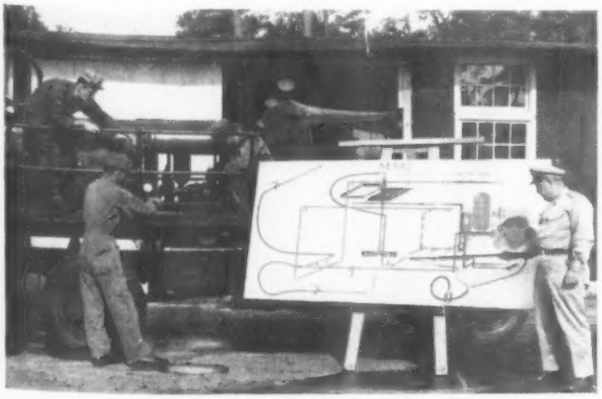
The present mission of the Air Chemical School is twofold. Its first responsibility is to train officers and airmen to perform efficiently the duties of Air Chemical Officers and Chemical Technicians throughout all echelons of the Air Force. Secondly, the School conducts staff studies on chemical problems peculiar to the Air Force and writes such manuals as required by the Air Force Training Command. Close liaisor is maintained between the School and higher echelons and other diverse chemical activities in order that the latest information available on new equipment and munitions may be obtained.

LT. COL. CLIFFORD R. OPPER, *U.S.A.F.*

At present there are eleven officers and twelve airmen assigned to the staff of the school. All instruction is conducted or supervised by the officers who have had wide experience in both offensive and defensive air chemical warfare or possess advanced technical backgrounds.

The majority of the instructors served overseas with the US Air Force during the last war and played a major part in planning and executing incendiary and smoke missions in all theaters of war.

Members of the staff are continuously studying the latest developments in air chemical warfare by attendance at service schools, by visits to research and experimental centers and by study of technical reports. Several of the officers are graduates of related Army and Navy schools.



All instructors have had extensive teaching experience or advanced work at civilian institutions and have been carefully selected for their various training and experience in the various phases of chemical warfare. The airmen have had years of service with the Air Force and have been especially trained for their assignments by attending courses conducted by the Air Chemical School. They act as assistant instructors, as classroom assistants and operate and care for all the equipment of the school.

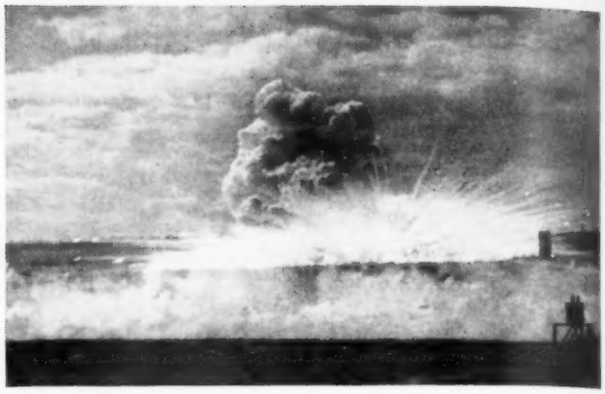
Ten buildings including four large classrooms and an auditorium are assigned to the School. The classrooms are well lighted, heated, ventilated and equipped with training aids. The auditorium seats one hundred students and is furnished with motion picture projectors. An exhibit of chemical equipment is maintained for the purpose of presenting a picture of the functions performed by the chemical segment of the Air Force.

The School is assigned a training area of sixty-five acres which provides ample space for conducting exercises in decontamination, filling, storage and handling of chemical munitions. The Keesler Field Rifle Range is utilized for maneuvers and demonstrations where toxic agents, fire bombs, large area smoke screens and incendiary bombs are involved.

The School maintains a motor pool consisting of the latest type of specialized chemical vehicles. These vehicles are used to train the students in all echelons of maintenance peculiar to this specialized equipment.

The School maintains in its files the latest technical information on all phases of chemical warfare. These files and also a small specialized library are available to the students at all times and they are constantly encouraged to do research work on a variety of subjects.

An estimate of the students grasp of the subject matter is obtained both from written examinations and from practical tests after attending lectures and observing and taking part in demonstrations.



At present the Air Chemical Officers Course (7314) is of three months' duration. Instruction is given six hours a day, five days a week for twelve weeks. The training is organized by departments, the School being subdivided for instructional purposes, into four branches: the Applied Sciences and Chemical Agents Branch, the General Subjects Branch, the Munitions and Materiel Branch and the Protection and Decontamination Branch. In addition to these four branches a small Administrative Section assists the Course Supervisor who is in charge of the School in maintaining effective overall control.

Within the department of Applied Science and Chemical Agents, instruction begins with a refresher course in general mathematics. The subject matter covered includes elementary equations, factoring, fractions, linear equations, exponents, radicals, logarithms and use of the slide-rule. Elementary inorganic and organic chemistry follow the mathematics review. Here emphasis is placed on the chemistry which aids in understanding the behavior of chemical agents. Then adequate time is devoted to the study of chemical agents to enable the students to appreciate how each agent might affect him and his equipment. Since climatic conditions more than any other factor determine the effectiveness of chemicals in the field, several academic days are devoted to a study of weather. A basic course in physics is then given as a background for the orientation on Radiological Defense which follows. Sufficient stress is placed on the subject of Radiological Defense to give the Chemical Officers an idea of the scope of this related technical field in the event he is assigned duties in this field before he has had opportunity to attend the special school on this subject. It can be seen then, that the more technical phases of the subject matter are taught within this branch.

The General Subjects Branch is responsible for the training in subjects of a less technical nature which are related to Air Chemical Warfare. This department presents the problems of supply with particular emphasis on chemical supply, the organization of the Chemical Segment of the Air Force and a thorough discussion of military training methods with emphasis on teaching the students to become good instructors themselves. A familiarization visit to the Army Chemical Center at Edgewood Arsenal, Maryland, is also monitored by this department.

Training in the use of the munitions employed by the Chemical Segment of the Air Force is given by the Munitions and Materiel Branch. Chemical and incendiary bombs, smoke tanks and all chemical munitions peculiar to the Air Force are studied exhaustively. The use of specialized equipment in the handling of these munitions is also covered in the course of instruction. The tactical employment of these munitions is also considered in detail including the effect that polar regions have on tactical employment of munitions and their maintenance and storage. Plans are being laid for the flying of practice smoke, spray and incendiary missions as a part of the instruction.

The Protection and Decontamination Branch discusses with the students the defensive aspects of air chemical warfare. The students are taught the prior planning necessary to insure the minimum of confusion and casualties resulting from an attack by the enemy and the proper procedures for decontaminating materials after such an attack. Instructional time is also devoted to the effects that polar climate and terrain exert on protection procedures and equipment. Students are also taught to identify incendiary fires and the correct procedures for extinguishing each type of fire.

The course for airmen in which they are taught the duties and responsibilities of a Chemical Technician is taught concurrently with the officers course by the same instructors. It is of two months' duration, classes meeting six hours daily, five days a week for eight weeks.

A Chemical Technician must also be proficient in training personnel in defense against chemical attack by a possible enemy. He must be able to relieve the chemical officer in case of emergency and must be able to advise his Commanding Officer in matters pertaining to air chemical warfare.

The classes in the Air Chemical Technician's Course follow along the same general lines as the classes in the Air Chemical Officer's Course but the subject matter in certain instances is not presented in as much detail nor from as high a technical level. The same facilities are available for instructional purposes and for demonstrations. Many of the classes in munitions and protection are held outdoors in the training area.

General Subjects taught in the technician's course include effects of weather and terrain on chemical agents and military training methods as well as the principles of chemical supply. An introduction to chemistry and physics and a thorough study of the chemical agents and their behavior is given. In the munitions classes actual filling of smoke tanks and fire bombs with liquid smoke mixture and jellied gasoline is taught. Decontamination procedures are taught for the greater part by practical exercises in actual decontamination using a simulated persistant gas. The actual gases are used in reconnaissance exercises. Operation of the power driven decontamination apparatus is one of the main requisites of the chemical technicians and a thorough indoctrination by actual operation of this apparatus is given in the course.

In the past, separate courses were held for Toxic Gas Handlers, Decontaminating Equipment Operators and Air Chemical Technicians. Under the new career program, however, an attempt has been made to combine the material previously given in these three separate courses into one course and title it the Chemical Technicians' Course. Therefore, with the Air Chemical Officers Course these two branches of the Air Chemical School compose an adequate training establishment sufficient to meet the technical requirements of the United States Air Force in this field.

Chemical Corps Personnel Policies

By MAJOR KARL F. ERICKSON

Executive Officer, Military Personnel Branch, Office, Chief, Chemical Corps

Many inquiries come in to the Military Personnel Branch from Reserve Officers and others interested in Reserve activities. The subjects most frequently discussed are made the basis for the following article.

Under the training policies for Reserve Officers established in Circular 356, Department of the Army, 1946, as amended, each of the six Army Commanders in the United States exercises command of and supervises the training of the ORC in the geographical area covered by his command. The Army Commanders apply training directives and programs received from the Commanding General, Army Ground Forces, for all Organized Reserve Corps units which would normally support a field army; supervise instructors by frequent visits by senior district instructors for the Organized Reserve Corps and by staff officers of the Army, or oversea departments, concerned; inspect units both during home (Armory) and field training periods by visiting staff officers of major commands concerned; conduct tests by teams from major commands or from technical services as appropriate during both home (Armory) and field training periods; and conduct spot inspections of Organized Reserve Corps units and visits to major commands by major forces, or by the chiefs of the technical and administrative services or their representatives, to coordinate standards of training.

Individual officers may obtain temporary active duty training through their local Organized Reserve Corps units for periods not to exceed ninety days. Within limitations of funds, active duty training may be obtained in order to attend courses at established service schools or for on-the-job training.

Extended Active Duty

The Department of the Army policy regarding extended active duty for Reserve Officers is outlined in Circular 27, Department of the Army, 1948. Briefly, this Circular recognizes that the officers of the Civilian Components on extended active duty continue to be an essential part of the Officer Corps of the Army of the United States. In fairness to these officers, the Circular has stated frankly the policy and position of the Department of the Army, which is essentially as follows.

MAJ. KARL F. ERICKSON, *Cml.C*

As long as present commitments exist, there will be a continuing need for a large number of Civilian Component officers on active duty. Circular 27 defines tours of extended active duty in order that the Army and the individual officer will have a better understanding of their commitments to each other. It provides for a system whereby should a reduction become necessary, the best qualified reserve officers will be retained for the longest period of time. A Civilian Component officer of appropriate age-in-grade may plan to remain on extended active duty for some years if he maintains a high standard of efficiency and if personnel requirements, budgetary limitations and ceilings permit his retention.

Categories which became effective in March 1948 permit all officers, who are qualified, to sign a Category III Statement in which they volunteer to remain on extended active duty for a period of three years subsequent to the last day of the month in which the officer's current birthday occurs. Commanders were authorized to disapprove such requests if the officers would not qual-

ify or were considered undesirable for further retention on active duty by reason of relatively low efficiency, demonstration of inaptness, misconduct, lack of attention to duty or lack of initiative. Toward the end of the three year period the officer may apply for renewal of his category statement for an additional three years and if his record has been good and conditions warrant, his request for further extended active duty would normally be approved.

Assignments Overseas

Overseas assignments of Reserve Officers now on extended active duty are determined based on Circular 249, War Department, 1947, as amended.

Due to the variation in desirability and comfort, so far as living conditions are concerned, the tours in the various overseas theaters were varied in length, effective 1 October 1947, as follows: (a) European Command—three years; (b) Far East Command (except Japan)—two years; (c) all other areas such as the Canal Zone, Japan and Alaska—two and a half years; and (d) special tours varying from one to two years are established for certain isolated stations such as Greenland, Nome and Fort Churchill, Canada. Officers are selected for foreign service in the following general priorities: (1) Those individuals whose reassignment is mandatory and whose eligibility for foreign service makes his reassignment in the United States uneconomical; (2) volunteers for foreign service; (3) officers with no foreign service since 7 December 1941; and (4) individuals with previous foreign service in the order of those having the least service first.

Promotion of Officers in the Officers Reserve Corps

Department of the Army Circular 246, dated 13 August 1948, announced the Department of the Army policy on the promotion of officers in the Officers Reserve Corps. Promotions will be made to fill available positions within the grade authorization as announced from time to time by the Department of the Army and will be applicable only to the active Reserve.

Promotions will be accomplished by selective procedures to secure the best qualified among those officers reasonably available to fill these vacancies.

Boards of officers designated by area commanders will convene for consideration and selection of these officers. All promotions will be made by appointment by The Adjutant General in the name of the President.

Reserve Officers on extended active duty in the AUS shall be eligible for promotion to the next higher grade in the Officers Reserve Corps, however, any such promotion while on extended active duty will not effect any change of current grade or status in which serving in the AUS.

Promotion of Reserve Officers in the AUS Who Are on Extended Active Duty

Until recently temporary promotions of Reserve Officers in the AUS who are on extended active duty have been frozen. AR 605-12, dated 30 September 1948, effective 1 November 1948, prescribes the system for effecting temporary promotions in the AUS of officers on active duty. Promotions made under this regulation do not effect any changes in the grade or status an officer might hold in the Officers Reserve Corps.

This new promotion policy provides that action shall be taken on a fair and equitable basis, regard being given to seniority, age, and selection based upon availability and efficiency. Promotion of officers to the temporary grade of Major and above will be made by Headquarters, Department of the Army. Promotion to the temporary grade of Captain will be made by major commands.

Prior to the initiation of any selection process, a zone of consideration will be established and announced by Headquarters, Department of the Army, for each grade from which officers are to be selected for promotion. The zone of consideration is defined as that portion of the roster of officers in any grade wherein the officers are sufficiently senior to be considered by a selection board for promotion. Reserve Officers will be arranged on the roster in order of their temporary dates of rank. When directed, immediate commanders will submit recommendations for or against the promotions of all officers under their command who are within the announced zone of considerations. The recommendations are forwarded to the Department of the Army for consideration by the Selection Board.

It is expected the first temporary promotions under this regulation will be made shortly after 1 March 1949.

Competitive Tour for Appointment in the Regular Army of Reserve Officers On Active Duty

Shortly after the recent separation of the Army and the Air Force, the initial transfer of some twenty-two Regular Army Chemical Corps officers to the Regular Air Force resulted in a corresponding shortage of Regular officers in the Chemical Corps.

Commissioning in the Regular Army of Reserve Officers, who successfully complete competitive tours, appears to offer the best opportunities

to fill these vacancies and additional ones caused by attrition, retirements, etc. AR 605-8 outlines the procedures for commissioning officers from the competitive tours.

Officers on a competitive tour are rotated every four months in assignments with practical on-the-job training. All competitive tour officers receive the same general type of assignments and perform duty under the same superiors whenever practicable. This insures fairness to all the competitive tour officers and assists the rating officers to properly evaluate the candidates and to determine who is qualified for the Regular Army.

The experience gained on the competitive tour broadens the officers' training and gives them and their superiors an opportunity to determine that field of specialization in which they are best fitted after commissioning. It is mandatory following their commissioning in the Regular Army that they be detailed for two years in one of the combat arms. This experience further broadens their training. Two Chemical Corps officers have been commissioned in the Regular Army, Chemical Corps, from the competitive tour and are now detailed to the Field Artillery.

Opportunities for Appointment in the Regular Army of Reserve Officers

Other than the appointment in the Regular Army of distinguished graduates from ROTC, the only other method for receiving appointment in the Regular Army at the present time, is through the competitive tour which is discussed in another part of this article.

It is understood that an Army Regulation is being drafted in the Department of the Army concerning the direct appointment of certain professional and technical specialists. It is anticipated the maximum age for appointment will be 32. The minimum educational requirement probably will be a Masters Degree or its equivalent. The professional fields will vary among the different technical services. The following fields will be listed for appointment in the Chemical Corps: Physics, Nuclear Physics, Chemistry, Chemical Engineering, Chemical Engineering Research, Meteorology, Bacteriology, Mechanical Engineering, Bio-Chemistry, and Industrial Engineering.

Appointments in the Regular Army made under this regulation will be only in the grades of Lieutenant and Captain. Publication and distribution of the regulation is expected in the near future.

Career Planning for Army Officers

The personnel policy of the Army is predi-

COL. RALPH C. BENNER
Chief, Military Personnel Branch

cated on the premise that the individual is the most important single asset in any army. In career planning it is realized that three points are very important to the individual: (a) The individual wants to think his job is important; (b) He wants the opportunity to advance; (c) He wants security. These points must be kept in mind in using wise human relationships in career planning.

Training for the jobs ahead never ceases in the Army. When war comes the who-for-what-and-where must be prepared and ready for the assignment. Big jobs knock at the officer's door over night. In peacetime, officers should not seek narrow compartments but should broaden their experience and training for the opportunities ahead. This is done by rotation from one job to another at any given post or station similar to rotation on competitive tour except the periods are one to three years instead of four months.

An officers' normal career between 7 and 17 years' service should be so planned as to permit foreign service, military, and if possible, civilian schooling. While the above is mainly made the objective of the Regular Army officer, since he normally is in the service continuously, in principle it should be used as a guide for the Reserve Officer where practicable even though he technically is in a three-year category status.

TM 20-605, June 1948, Career Management for Army Officers, is a guide in career management for all officers. Chemical Corps Officers are encouraged to read and study that portion of the manual applicable to them.

Career Guidance Plan for Warrant Officers and Enlisted Personnel

Department of the Army Circular 1, 1948, establishes in the Army an orderly and systematic plan of assignment, training, and promotion for enlisted men and warrant officers so as to make service in the Army a dignified and attractive career for the American citizen who desires to serve his country, and to permit his advancement to the highest grades and rank, limited only by his ability, integrity, and initiative.

Career guidance is a broad program, designed to make possible the orderly advancement of qualified enlisted personnel to positions of responsibility. A system of controls, geared to the individual's interest and proficiency, in a selected career field, constitutes the basis for this program. Career guidance is Army-wide in its scope, thereby making available to every enlisted man the opportunity to develop himself in a field of activity essential to the needs of the Army. While the needs of the Army are primary factors in determining career fields, many of these fields afford, in differing degrees, training and experience comparable to civilian skills. The Army will make every effort to insure that men eligible for retirement and leaving the Army will have been given the opportunity to acquire a skill that can be converted to civilian use, by virtue of having been assigned and trained in such a type of career field at some time in their Army career. Enlisted men meeting specific requirements will be encouraged to progress in career fields at the most rapid rate commensurate with the interests of the Army, as well as with their interests and abilities. The system of career guidance, involving self-improvement, apprentice and school training, provides for grade advancement through competition. Finally, this program will build a permanent peacetime Army of broadly trained, well-rounded enlisted personnel and warrant officers, who will in time of emergency, make an important contribution as an adequately trained cadre for mobilization.

Mobilization

There are at the present time more than 5,000 Chemical Corps active Reserve Officers of which approximately 4,500 are assigned to some type of ORC unit for training.

Department of the Army, Circular 199, 1948, provides for the mobilization assignment of Reserve Officers. The Director of Personnel and Administration, General Staff, U. S. Army, has the overall responsibility for the mobilization assignment of all Reserve Officers on extended active duty, and for those whose mobilization assignments are under the jurisdiction of Headquarters, Department of the Army. These assignments are coordinated with the Director of the General and Special Staff Divisions, Chief of the Administrative and Technical Services and Chief, Army Field Forces.

The mobilization assignment or training attachment for members of the Officers Reserve Corps not on extended active duty and whose mobilization assignments are not under the control of the Headquarters, Department of the Army, is the responsibility of the Commanding Generals, Area Commands.

The Chiefs of Technical and Administrative Services are required to prepare a Table of Distribution for each of the organizations under their control, to which, when approved by Operations and Training Division, General Staff, U. S. Army, selections of qualified Reserve Officers for mobilization assignment to these units will be made.

The Chemical Corps is now in the process of selecting officers for mobilization assignments to Table of Distribution Units under its control, which consists of the Procurement Districts, Arsenals, Office, Chief, Chemical Corps, and other installations under the direct control of the Chief, Chemical Corps. Lists of Reserve Officers who have been selected by the Chief, Chemical Corps, for mobilization assignment to a Table of Distribution Unit are being forwarded through the Adjutant General to the Commanding General of the Army in which the Table of Distribution Unit is located. The Commanding General of the Army will issue the orders organizing the unit and assigning the selected Reserve Officers thereto. Each Reserve Officer given a mobilization assignment will be notified by the Commanding General of the Army in which he resides.

Mobilization assignments will be made with a view to utilization of an officer in that capacity on mobilization; however, it must be realized that this will not be practicable in all cases; therefore, an officer receiving a mobilization assignment cannot be assured that his assignment will be adhered to in the event of actual mobilization. Mobilization assignments will be reviewed annually to insure that special skills and talents are

(Continued on page 47)

Chemical Mortar Units Get Navy Citation

Two more Chemical Mortar Units have recently been awarded Presidential Unit Citations (Navy), in the name of the President by the Secretary of the Navy. Battery "B" of the 88th Chemical Mortar Battalion, and the 91st Chemical Mortar Company, Separate, were listed in General Order 73, dated November 2, 1948, along with numerous other Army Units.

Battery "B" was in support of the First Marine Division, Reinforced, while the 91st Chemical Mortar Company supported the Sixth Marine Division, Reinforced.

The citation of the former read as follows:

"For extraordinary heroism in action against enemy Japanese forces during the invasion and capture of Okinawa Shima, Ryukyu Islands, from April 1 to June 21, 1945. Securing its assigned area in the north of Okinawa, by a series of lightning advances against stiffening resistance, the First Marine Division, Reinforced, turned southward to drive steadily forward through a formidable system of natural and man-made defenses protecting the main enemy bastion at Shuri Castle. Laying bitter siege to the enemy, until the defending garrison was reduced and the elaborate fortification at Shuri was destroyed, these intrepid Marines continued to wage fierce battle as they advanced relentlessly, cutting off the Japanese on Oroku Peninsula and smashing through a series of heavily fortified, mutually supporting ridges, extending to the southernmost tip of the island, to split the remaining hostile force into two pockets, where they annihilated the trapped and savagely resisting enemy. By their valor and tenacity, the officers and men of the First Marine Division, Reinforced, contributed materially to the conquest of Okinawa, and their gallantry in overcoming the fanatic enemy in the face of extraordinary danger and difficulty adds new lustre to Marine Corps history, and to the traditions of the United States Naval Service."

Commanding Battery "B" during this period was Captain E. L. Lockman, Jr., CmlC. Other officers of this unit at that time were Lieutenants R. D. Hawthorne, John Havlik, John A. Landt, Kent S. Manning, Jr., Ronald A. Mayster, Frank R. Novotny, Marion W. Oliver, George G. Bachman, and Chester H. Wesch.

The citation for the 91st Chemical Company, Separate, read as follows:

"For extraordinary heroism in action against enemy Japanese forces during the assault and capture of Okinawa, April 1 to June 21, 1945. Seizing Yontan Airfield in its initial operation, the Sixth Marine Division, Reinforced, smashed through organized resistance to capture Ishikawa Isthmus, the town of Nago and heavily fortified Motobu Peninsula in 13 days. Later committed to the southern front, units of the Division withstood overwhelming artillery and mortar barrages, repulsed furious counterattacks and staunchly pushed over the rocky terrain to reduce almost impregnable defenses and capture Sugar Loaf Hill. Turning southeast, they took the capital city of Naha and executed surprise shore-to-shore landings on Oruku Peninsula, securing the area with its prized Naha Airfield and Harbor after nine days of fierce fighting. Reentering the lines in the south, Sixth Division Marines sought out enemy forces entrenched in a series of rocky ridges extending to the southern tip of the island, advancing relentlessly and rendering decisive support until the last remnants of enemy opposition were exterminated and the island secured. By their valor and tenacity, the officers and men of the Sixth Marine Division, Reinforced, contributed materially to the conquest of Okinawa, and their gallantry in overcoming a fanatic enemy in the face of extraordinary danger and difficulty adds new lustre to Marine Corps history, and to the traditions of the United States Naval Service.

Commanding the 91st during this period was Captain Eugene F. Them, CmlC. Other officers of the 91st were Lieutenants Robert L. Ryan, William J. Bryant, Rex T. Carlisle, John E. Clarke, Carl F. Jaegers, and Theodore T. Swenson, all of CmlC, and Lieutenants John F. McCoin and Glenn D. Massey, both Infantry.

ARMY SCHOOL OFFICIALS VISIT CHEMICAL CENTER

Pictured, left to right, are, front row—Colonel Stanley R. Mickelsen, Brigadier General Joseph S. Bradley, Major General William G. Livesay, Brigadier General E. F. Bullene, Brigadier General Charles E. Hart, and Colonel C. C. W. Allen. Back row: Colonel Leslie D. Carter, Brigadier General Harlan N. Hartness, Colonel Geoffrey Marshall, and Major K. L. Scott.

Mercury Amalgam Chlorine Cells

H. A. KUHN, *Chemical Consultant*
Washington, D. C.

The production of chlorine is a matter of primary interest to the Chemical Corps. Chlorine is used in the production of every chemical agent and every standard decontaminating agent. The center of each of the four Chemical Corps Arsenals is the chlorine plant.

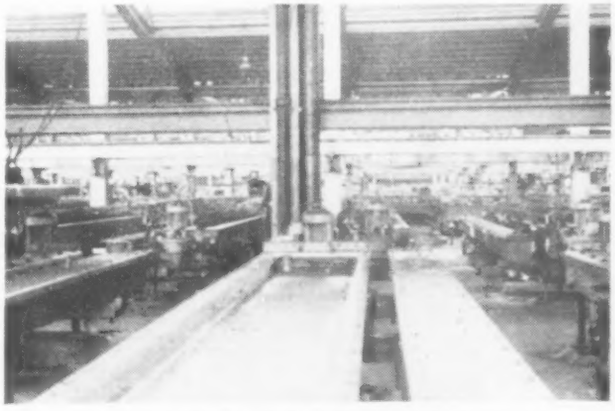
In addition to direct military uses there are very few other chemical raw materiels which find as diversified application in the chemical economy as does chlorine. Some of the multitude of uses of chlorine in World War II were mentioned in the very informative article by Dr. Robert Baldwin in the October issue of the *Journal*. He points out that chlorine production increased from 696 thousand tons in 1940 to 1266 thousand tons in 1943. Not only did all this increase go into military items, but additional tonnage was withdrawn from 1940 civilian uses, such as pulp and paper, for production of chemicals for military use.

Production since 1945 has increased 50 percent, and today we have a productive capacity of about 4,900 tons per day with a demand in excess of supply. It is believed that the actual production in 1949 will be 150,000 tons over 1948, or about 1,750,000 tons. Practically all this postwar increase goes into the production of other chemicals, and these chemicals will be just as essential in war as in peace. With all our arsenals and other government built chlorine plants despite several in uneconomical locations now in civilian use, planning to meet a future wartime demand is just as vital today as it was in 1940.

Because of its primary interest in chlorine the Chemical Corps included chlorine experts in the first team of industrial investigators sent to Germany in February, 1945. These first investigators were followed by other chlorine experts who explored the German chlorine industry through 1945. In January, 1946, a team of seven engineers, drawn from the chlorine industry, was sent to Germany to make a detailed investigation, particularly of the mercury chlorine cell development. This team was also instructed to collect and ship to the United States samples of the two principal types of German mercury cell. These cells were assembled and first placed on public display at the annual meeting of the Chemical Corps Association in May, 1947. The detailed information secured by these Chemical Corps investigators is already influencing the design of at least two of the large chlorine plants built in the western hemisphere this year.

The mercury cell is not a new development in the industry, in fact, it is about as old as the diaphragm cell. The first commercial mercury chlorine cell was invented by an American, Hamilton Y. Castner, and the first commercial plant was built in Saltsville, Virginia, in 1895. The Castner cell has been in operation to the present time. However, both in Europe and in the United States the continually expanding chlorine industry for forty years was along the line of diaphragm cell production. Chlorine was the principal product desired, and it was cheaper to produce chlorine by the diaphragm rather than the mercury type cell. The diaphragm cell required somewhat less power, the steam required for concentration of the diluted caustic was cheap, while on the other hand the mercury cell required large quantities of expensive mercury.

In the mercury cell where purified brine electrolyzed between a mercury cathode and a graphite anode liberating chlorine and forming a sodium mercury amalgam, which in turn reacts with water to form caustic soda and hydrogen, liberating the mercury, the principal advantage is the formation of concentrated caustic soda of high purity. The caustic soda produced by the mercury type cell is particularly well suited, without further purification, for the production of synthetic fibers such as rayon. Because of the intensive demand by the rayon industry, the mercury type cell came into extensive use in both Europe and Japan beginning about 1930. By



I.G. Horizontal Cell Assembly
Cover Electrolyzer Removed (left)

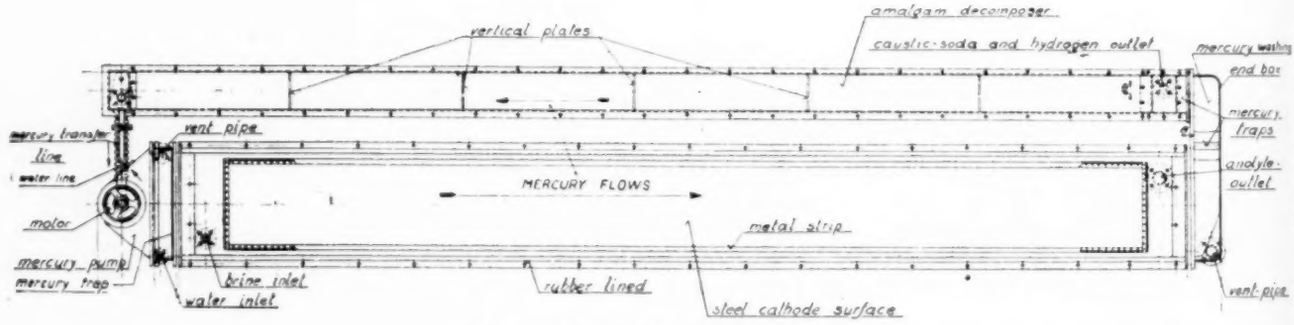
the beginning of World War II about 60 percent of the total output of chlorine in Germany and about 50 percent in Japan was from the mercury type cell. About 5.8 percent of the chlorine capacity of the U. S. is now in mercury cell installations.

The literature on the mercury cell prior to the release of the research records of the I. G. Farbenindustrie was very scanty. Details of the various mercury cells that had been developed were closely guarded company secrets. The detailed results of the millions of dollars of research and production records of I. G. Farben from 1930 to 1945, now made available to the American industry, has stimulated intense interest in this country in this type cell. A new mercury cell plant has just been completed in Canada and construction of two other mercury cell plants is now under way. Several new mercury type cells have been revealed and others are under development. With the continuing demand for pure caustic soda placing emphasis on this product of the cell rather than chlorine, it is probable that interest in the mercury type cell will continue and its use expanded. This article will endeavor to point out a few of the salient features of each of the better known cells.

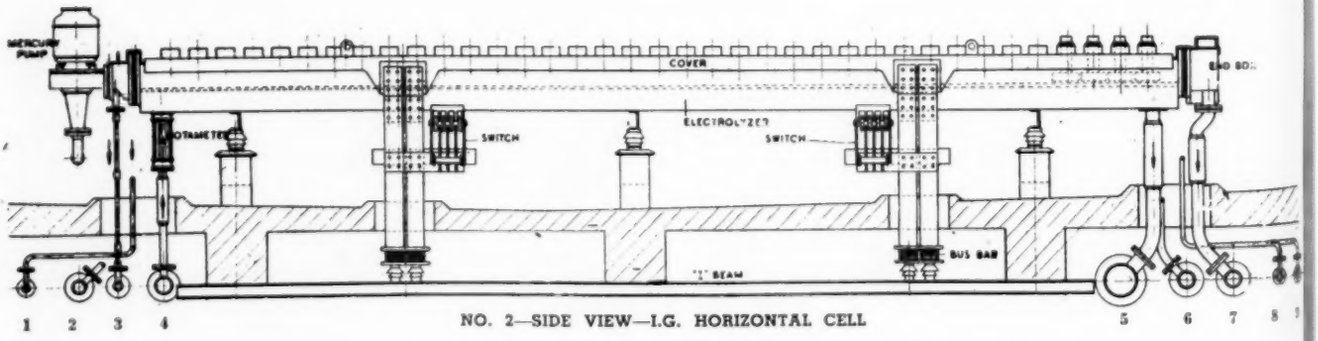
Germany

The predominant cell used in Germany is the so-called horizontal cell, the latest type being 14 meters long. The body of the cell is constructed of two steel I-beams. Mercury and brine, admitted at one end of the cell, flowed by gravity toward the other end. The brine is decomposed by passing direct current between a graphite anode and a mercury cathode thus forming chlorine and sodium-mercury amalgam. This amalgam, transferred to a parallel decomposure cell of equal length, is decomposed with water to form 50-70 percent caustic soda, liberated mercury being recycled to the electrolyzer. The construction of the conventional horizontal cell is indicated in diagrams 1 and 2.

The over-all dimensions of the I. G. horizontal cell are large, the 14 meter cell occupying a space approximately 4'8"x52'. They operate at 14,000 to 24,000 amperes and the trend in design was to cells of twice this high amperage. In order to conserve floor space, I. G. Farben developed the vertical type cell, which required far less floor space, and has other advantages over the horizontal type. This cell was designed to operate at

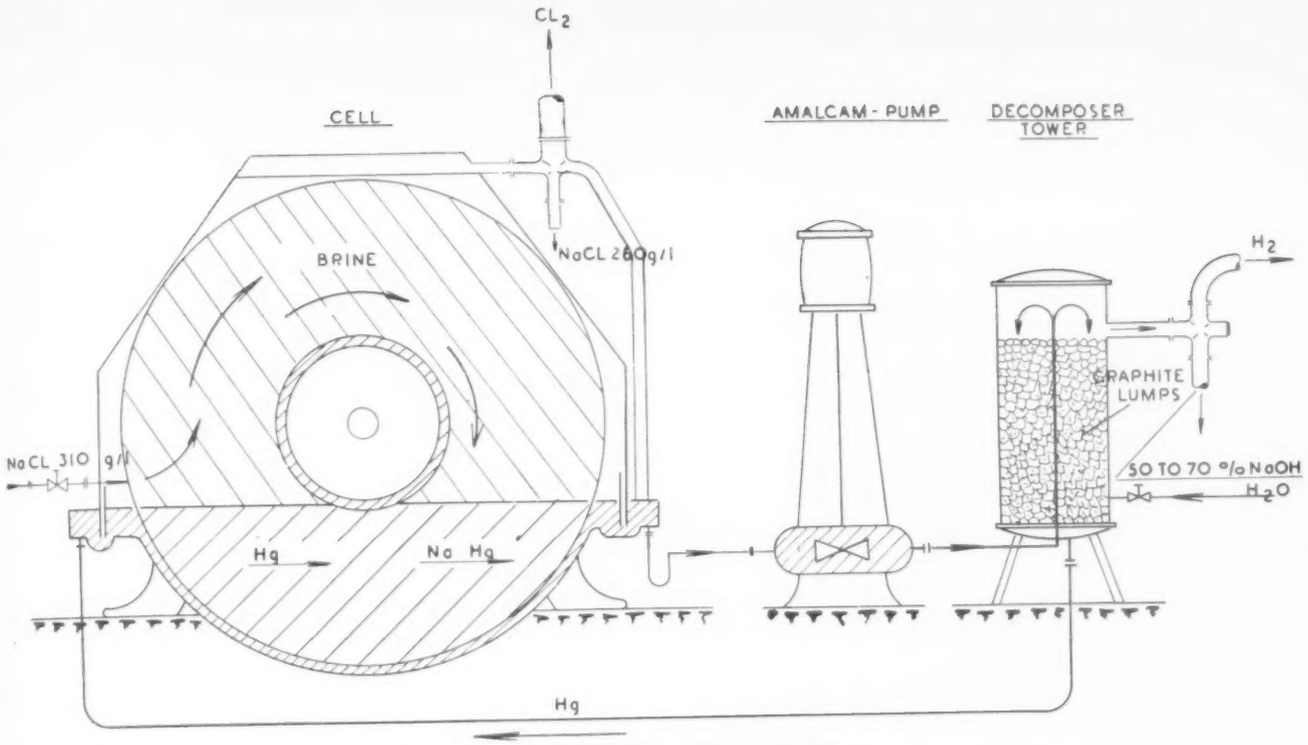


NO. 1—TOP VIEW—I.G. HORIZONTAL CELL



NO. 2—SIDE VIEW—I.G. HORIZONTAL CELL

1. Vacuum. 2. Hydrogen Vent. 3. Pure Water. 4. Brine Inlet. 5. Brine and Chlorine. 6. Caustic Soda-Hydrogen. 7. Chlorine Vent. 8. Service Water. 9. Air.



NO. 3. I.G. VERTICAL DRUM-TYPE CELL

24,000 amperes but cells of four times this amperage were visualized.

There are three major component parts of the vertical mercury cathode cell: the electrolyzer, the amalgam pump and the amalgam decomposer. In the electrolyzer sodium chloride brine is decomposed to metallic sodium and chlorine gas by the passage of an electrolyzing current from graphite anodes, attached to the top section of the cell, to a rotating vertical cathode. The chlorine gas is removed from the electrolyzer through a pipe connected near the top and above the electrolyte. The metallic sodium formed reacts with the mercury cathode to form sodium amalgam which flows from the electrolyzer by gravity. The amalgam pump then elevates this amalgam to the top of the amalgam decomposer which is packed with graphite chunks. In the decomposer the sodium-amalgam is brought into intimate contact with purified water with which it combines chemically to form concentrated sodium hydroxide solution and hydrogen gas. The sodium-free mercury then flows by gravity back into the electrolyzer. This cycle is continuous and is shown in diagram 3. Although three plants were in operation at the end of the war this cell is still considered as being in the development stage.

Japan

In order to secure rayon grade caustic soda, the Japanese chlorine industry began converting to the mercury type cell in 1931. Three installations used the Krebs type cell, three others used a modification of the Krebs cell known as the Showa type. Nine plants used a cell developed by the Osaka Soda Works.

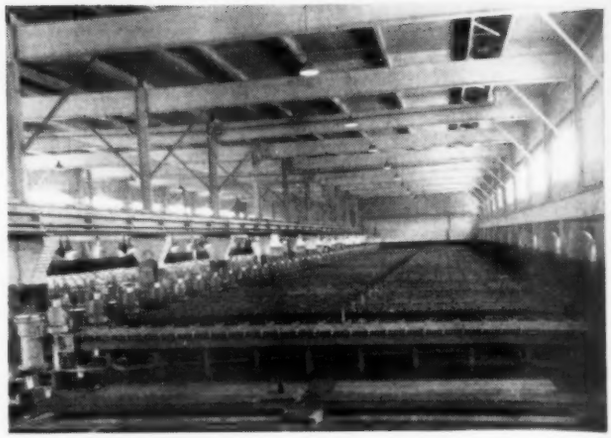
The Krebs type cell consists of a concrete electrolysis chamber 21″x33′, sides lined with either porcelain or glass, and a concrete amalgam decomposition chamber, lined with iron, parallel with and at a lower level than the electrolysis chamber (Exhibit 4). The chambers are separate and are supported on porcelain insulators on a concrete foundation. The insulators are equipped with adjusting nuts to adjust the slope of the surface of the chambers so as to regulate the flow of the mercury through the cell.

The anode for the electrolysis cell is made of graphite electrodes, usually 1⅜″x3½″x18″. Each anode unit consists of four electrodes, placed across the width of the chamber. The unit is supported by graphite leads, which project through the slate cover and connect to a copper bus. The mercury cathode surface is made of iron pieces set in the concrete bottom of the trough.

In the Showa modification, the anodes are fixed to the cover and adjustment for wear is made by removing ebonite shims between body and cover. An average of twelve pieces of grooved bottom graphite is used across the width of each depolizer section, as compared to six or eight smooth bottomed pieces in the Krebs decomposition chamber. Both the Krebs and the Showa operate at 6,000 amperes, with the exception of a small installation of Krebs operating at 7,000 amperes. The screw type mercury pump of the Showa is gear driven rather than by an individual motor as in the original cell.

The Osaka type cell was designed about 1931 by the Osaka Soda Company. This cell is designed to operate at a lower current density than the Krebs — 10-18 amperes vs. 18-21 amperes per square decimeter. The cell consists of an electrolysis chamber and an amalgam decomposition chamber, both constructed of concrete and both enclosed in the same iron box. The iron box rests on fixed ebonite insulators. There is no means of adjusting the slope of the individual chambers, which slope in opposite directions, after they are first constructed. The cells range in size from 21″x14′ to 36″x25′. All of the cells are designed in the same manner, regardless of size. The amperage per cell varies from plant to plant from a low of 2,300 to a high of 10,000.

The electrolysis chamber is porcelain or glass lined with a slate cover insulated from the sides by either porcelain or ebonite. The anodes, about 62 per cell, are set in the cover, the iron cathode surfaces are set in the concrete bottom. The iron cover of the decomposition chamber fits inside the concrete chamber to furnish both the sides and top. The mercury pump is a paddle-wheel type, belt driven.

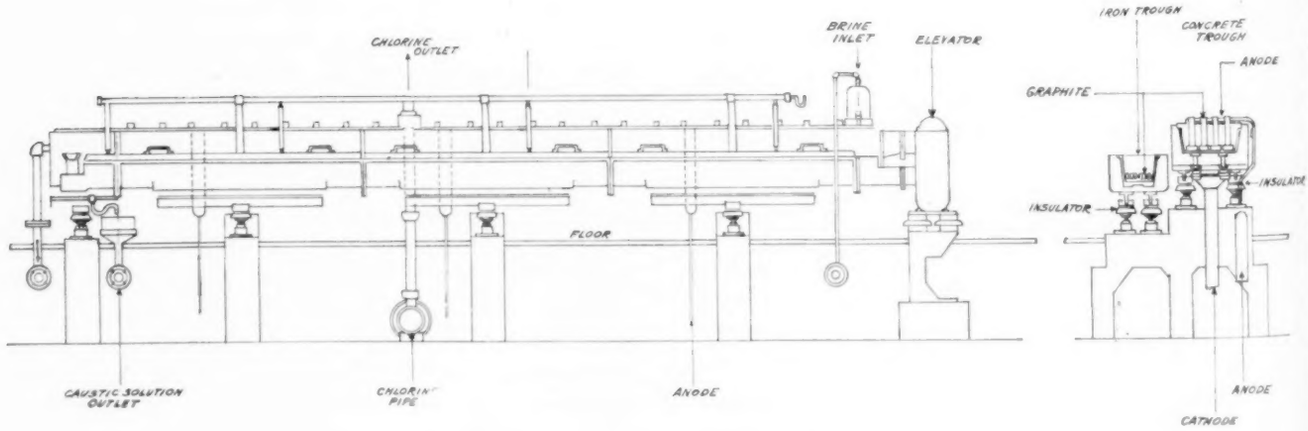


Aluminum Co. of Canada, Arvida, Que.
Mathieson Cell Installation

The Japanese state they did not use iron or steel bottom electrolysis troughs because mercury is scarce in Japan, and the cells are made to operate with barely enough mercury to form a layer on the bottom. With iron inserts there was less chance of exposure and attack by chlorine. They have not used rubber as lining but use porcelain and glass instead. They used only flat surface graphite anodes, rather than the groove type used elsewhere.

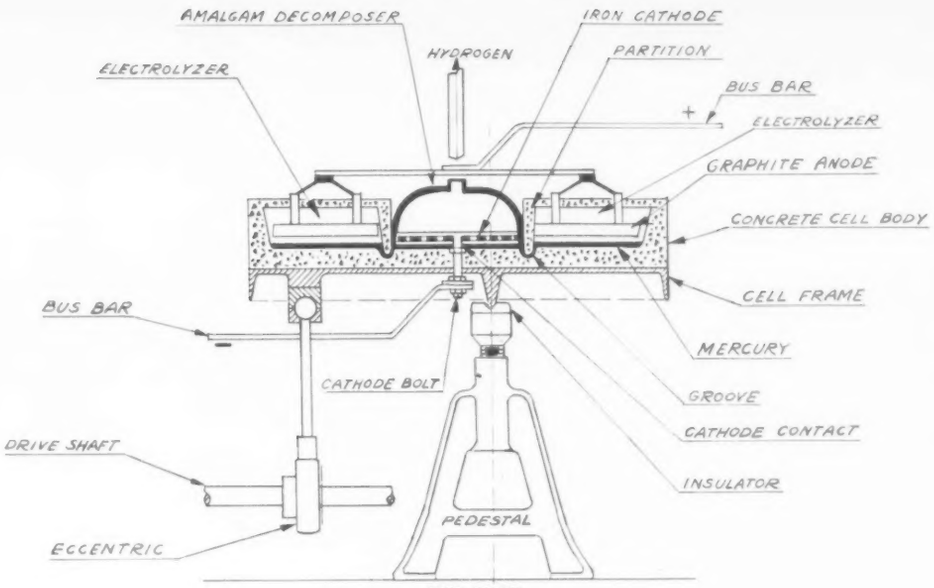
United States and Canada

The first large mercury cell plant in the United States was put in operation in Niagara Falls in 1897 by the Mathieson Chemical Corporation. This cell was the rocking type, invented by Hamilton Y. Castner, and through the years has undergone continuous improvement, so that the cell output has been trebled. This cell has been operated longer than any type mercury cell in the world.



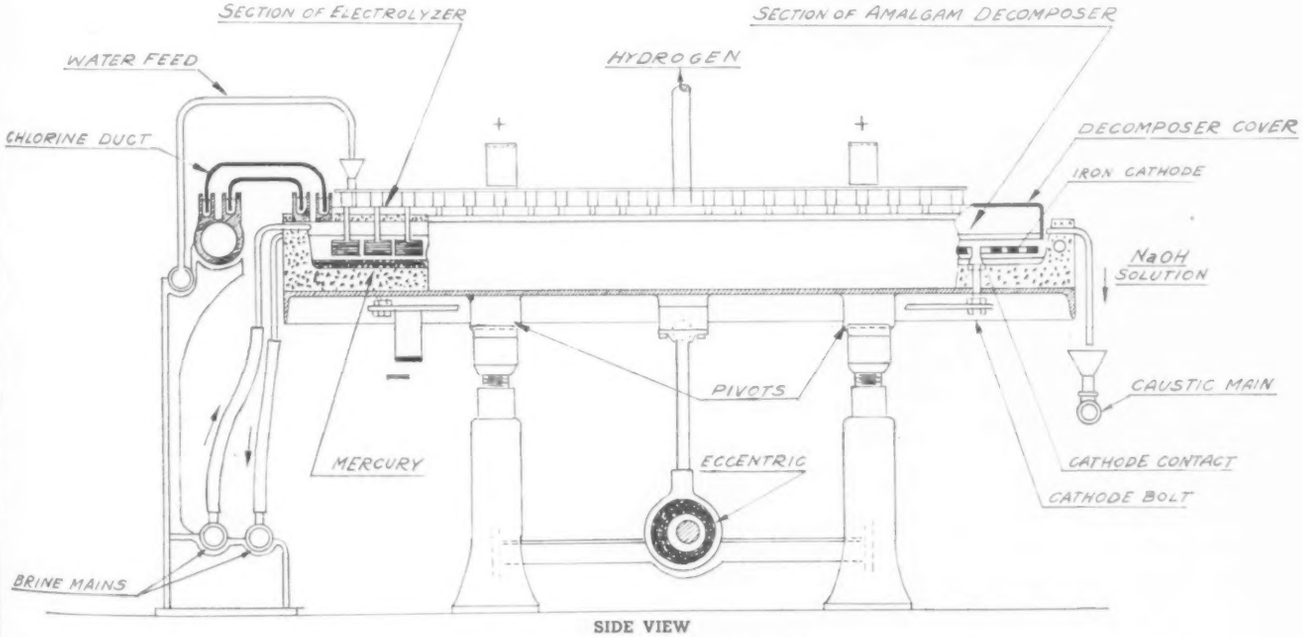
NO. 4. KREBS TYPE CELL—JAPAN

The cell (diagram 5 and 6) consists of a shallow concrete box divided into three equal compartments by partitions dipping into grooves running lengthwise in the cell bottom. It is mounted so that it can be slowly rocked through a small angle by means of a continuously operating eccentric. A thin layer of mercury lying on the cell bottom flows back and forth from one compartment to another through the grooves and seals and keeps other fluids in their respective compartments. The two outer compartments act as electrolyzers and the amalgam decomposer is in the center. Brine enters at one end of one electrolyzer compartment, flows through it to the opposite end. Graphite anodes are suspended from the concrete cover of each electrolyzer compartment. Cathode bolts through the cell bottom carry the current to the mercury layer. The amalgam formed in the electrolyzer is decomposed in the central compartment where it is short-circuited to either a cast-iron or graphite cathode in the presence of water. The amalgam is kept at 0.02 to 0.04 percent sodium and the caustic strength is limited to 30-35 percent. The original cells designed for 550 amperes have been gradually improved until their capacity is about three times the original.



END VIEW
NO. 5. MATHIESON CASTNER CELL

Within recent years Mathieson developed a horizontal type mercury cell and has completed the installation of this new cell at the Aluminum Company of Canada Plant at Arvida, Quebec. This cell is somewhat similar to the German type horizontal cell but does not require the degree of brine purification; it requires only 50 percent of

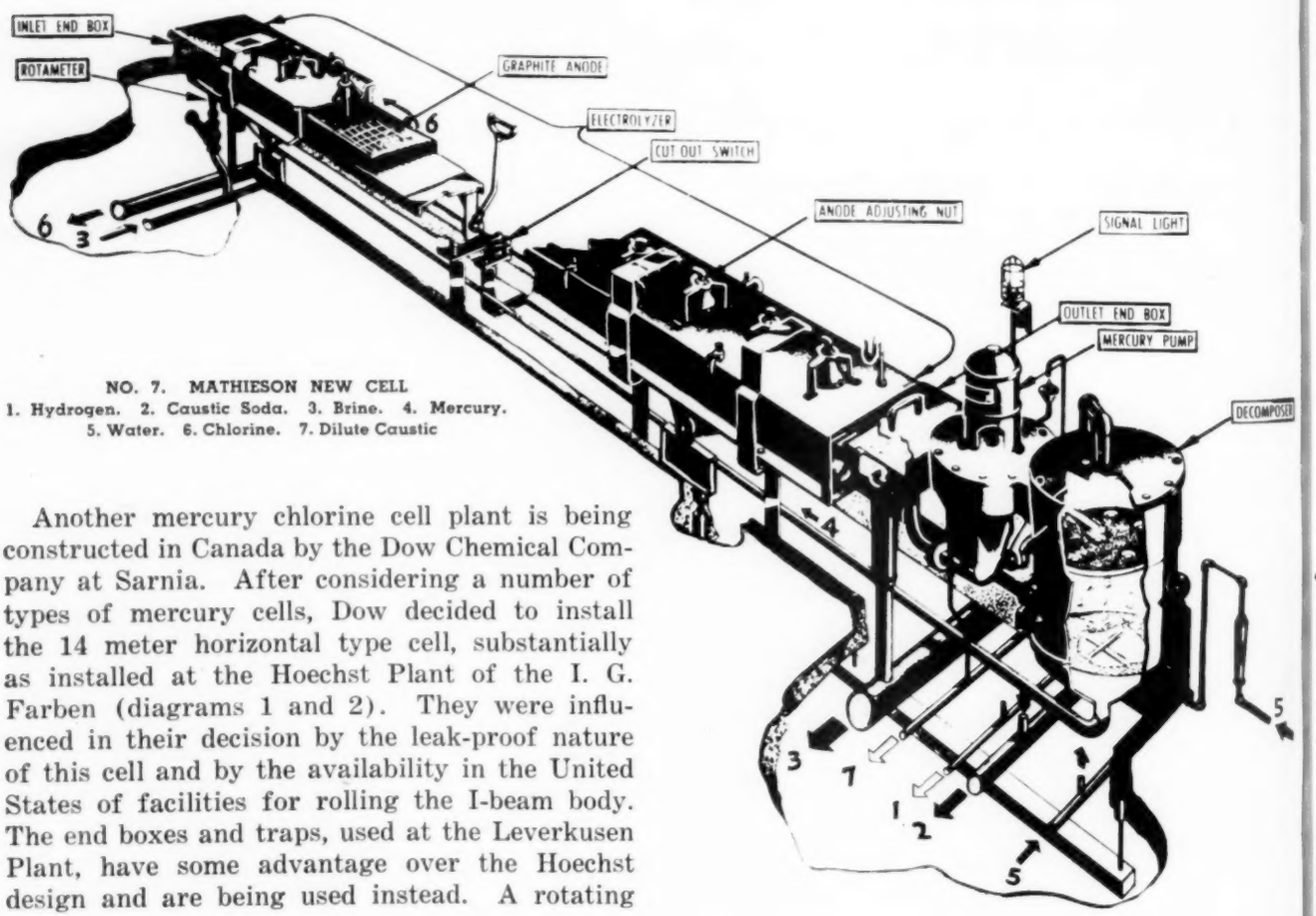


SIDE VIEW
NO. 6. MATHIESON CASTNER CELL

the floor space and the anode construction gives a lower energy consumption by about 15 percent at equal current densities. The Arvida installation uses the same brine chlorination equipment as is used in the I. G. Farben installation. A fabricated cell body, rather than the I-beam body of the German horizontal cell, was used to lower construction costs (diagram 7).

The bottom of the electrolyzer is formed by a channel set on insulated pedestals with the flanges pointed downward. The sides of the electrolyzer are made from copper covered angles, bolted to the bottom channels, sealed with soft rubber gaskets. The decomposer is of the tower type filled with graphite, held tightly between screens. The mercury amalgam enters the top of the decomposer and pure water is forced through it from the bottom.

This cell claims a lower power consumption than other mercury cells due to the anode construction which is readily adjusted by turning a nut so that the current distribution to each anode can be regulated without interrupting the cell current. The pump in this cell is located between the amalgam collecting box and the decomposer and is a paddle impeller type, motor driven.

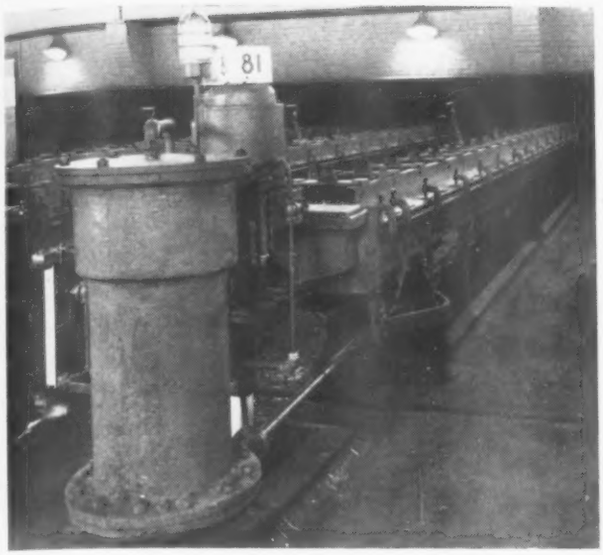


NO. 7. MATHIESON NEW CELL
1. Hydrogen. 2. Caustic Soda. 3. Brine. 4. Mercury. 5. Water. 6. Chlorine. 7. Dilute Caustic

Another mercury chlorine cell plant is being constructed in Canada by the Dow Chemical Company at Sarnia. After considering a number of types of mercury cells, Dow decided to install the 14 meter horizontal type cell, substantially as installed at the Hoechst Plant of the I. G. Farben (diagrams 1 and 2). They were influenced in their decision by the leak-proof nature of this cell and by the availability in the United States of facilities for rolling the I-beam body. The end boxes and traps, used at the Leverkusen Plant, have some advantage over the Hoechst design and are being used instead. A rotating cone pump of Hoechst design is used to circulate denuded mercury from the decomposer to the electrolyzer. The cell has been rated at 20,000 amperes at nominal load. This plant will be in operation next year.

A third Canadian mercury cell plant is under construction for the Dominion Alkali Company at Beauharnois, Quebec. This plant will use the Krebs type cell and will be the third largest mercury type cell installations in either U. S. or Canada. No information is available as to the details of the cells being installed. The diagram of the Krebs cell as installed in Japan (diagram 4) is of an installation made in 1935.

The Monsanto Chemical Company has recently offered in the United States the DeNora mercury cell developed in Italy by Dott. Ing. Oronzio DeNora of Milan. This type of cell with a tower decomposer not only reduces the floor space of horizontal decomposers, but also reduces the amount of mercury required in the system. It has a non-conducting bottom as well as sides rather than the steel bottom of the German cell. Cathode connections to the mercury are fixed at intervals along the bottom (diagram 8). Several

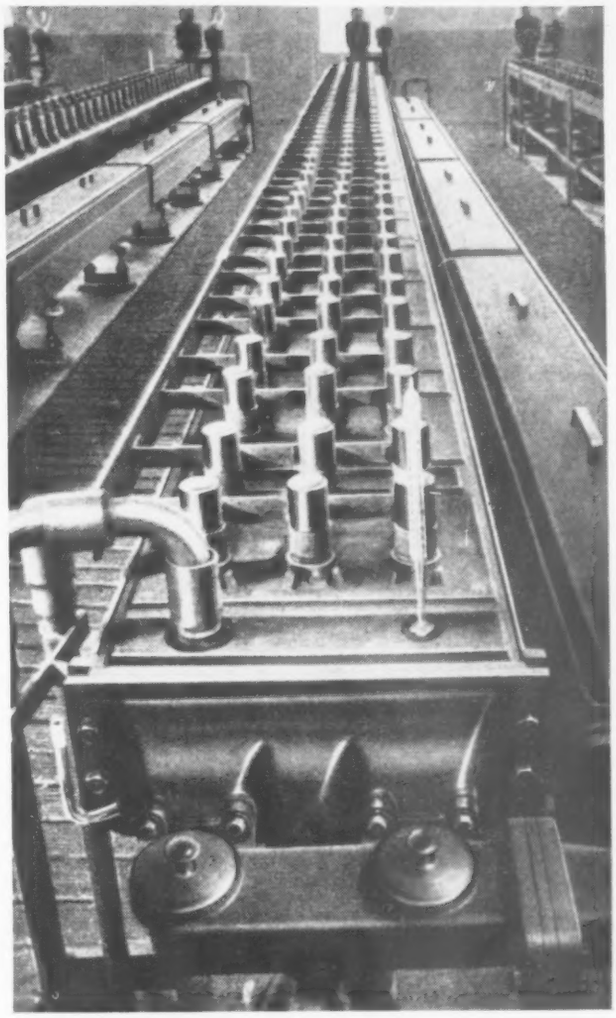


Mathieson New Cell—Arvida, Que.

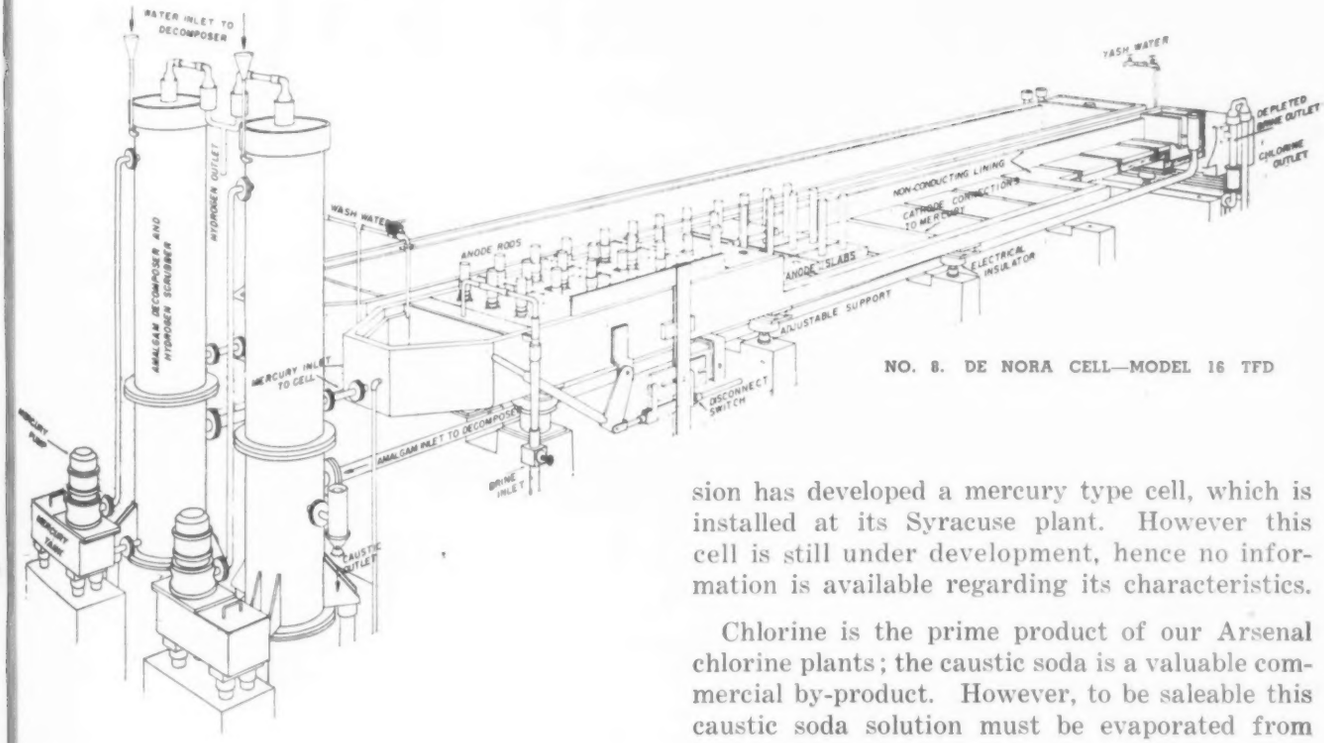
European plants use this cell but none have been installed in the U. S.

In 1938 Wyandotte Chemicals Corporation completed a sizeable installation of Imperials Chemical Industries type mercury cell at its Wyandotte plant. Recently this installation was considerably expanded, using the same type cell with Wyandotte improvements. No information is available on this cell but it is presumed to be basically a horizontal cell somewhat similar to the I. G. cell.

It is understood that the Solvay Process Division has developed a mercury type cell, which is installed at its Syracuse plant. However this cell is still under development, hence no information is available regarding its characteristics.



Krebs Cell Installation



NO. 8. DE NORA CELL—MODEL 16 TFD

Chlorine is the prime product of our Arsenal chlorine plants; the caustic soda is a valuable commercial by-product. However, to be saleable this caustic soda solution must be evaporated from

Table I

CHARACTERISTICS OF SEVERAL TYPE CELLS

	I.G. 14 M. Horizontal	I. G. Ludwigshafen Vertical	Krebs-Japan	Osaka Soda Japan	Mathieson-Arvida	DeNora-Large
Current Amperes	20,000	24,000	6,000	10,000	15,000	15,000
Cell Voltage	4.5	4.0	4.4 - 4.7	4.5	3.9 - 4.3	3.9 - 4.2
Ampere Efficiency	93-95%	92-94%	90-93%	92%	95%	94-96%
Cl_2 Output per Cell per Day	1,045 lbs.	1,540 lbs.	374 lbs.	638 lbs.	1,012 lbs.	1,000 lbs.
Kw Hours per Ton Cl_2	3,470	3,490	3,600	3,400	3,100	2,850-3,150
Weight Mercury per Cell	3,190 lbs.	2,640 lbs.	n.a.	1,650 lbs.	1,900 lbs.	2,000 lbs.
Chlorine Purity	95-97%	96-98%	n.a.	n.a.	97%	97±2%

n.a.—not available

about 12 percent concentration to at least 50 percent with the consumption of 9 to 12 thousand pounds of steam per ton. This is an extra operation consuming fuel, labor and management not directly related to the primary mission of the Arsenal, production of chemical agents and munitions. It is possible that the commercial development of the mercury type cell in this country will eliminate some of the past drawbacks of this cell and cause it to be considered for use in any additional Arsenal chlorine capacity expansion.

Appreciation is expressed for the valuable assistance of W. C. Gardner, Mathieson Chemical Corp. and Chemical Engineering; Robert B. MacMullin of R. B. MacMullin Associates and Chemical Industries; C. M. Dean, Monsanto Chemical Company; and Ralph M. Hunter, Dow Chemical Company, for data included in this article.

DRYDEN RUBBER DIVISION

SHELLER MANUFACTURING CORP.,

1014 SOUTH KILDARE AVENUE

Chicago 24, Illinois

*

MANUFACTURERS OF

Molded Mechanical Dense Rubber . . . Molded Hard Rubber . . . Extruded Rubber . . . Chemically Blown Sponge Rubber . . . Rubber Heels and Soles Rubber and Electrical Friction Tape

*

. . . Factories . . .

CHICAGO, ILL. KEOKUK, IOWA SPRINGFIELD, ILL.

R. & D. Group Activated at Edgewood

The Second Army has recently announced the activation of the 2401st Research and Development Training Group, with headquarters at the Army Chemical Center. Col. L. Wilson Greene, CmlC-Res, has been designated as Commanding Officer of the Group.

Other Chemical Corps Reserve Officers whose qualifications for membership in the Group have been approved by the General Staff, U. S. Army, are as follows: Col. Edward M. Hoshall, Lt. Col. Thomas R. Hayner, Lt. Col. Leslie E. Herbert, Lt. Col. Robert L. Fox, Lt. Col. Fred B. Shaw, Lt. Col. John J. Brown, Maj. Irvin O. Pritchett, Maj. Theodore P. Steinmetz, Maj. Gordon N. Jarman, Maj. Ralph E. Bolgiano, Maj. William H. Daiger, Maj. Egbert W. Hollingsworth, Maj. Benjamin L. Harris, Maj. Leonard T. Pool, Maj. Walter H. C. Rueggeberg, Maj. Louis Benjamin, Maj. Edmund H. Schwanke, Maj. Theodore S. Zajac, Maj. Louis C. Palmer, Maj. Samuel L. Goldheim, Capt. Lee M. Kindley, Capt. Bruce A. Hildebrand, Capt. Paul F. Gaus, and Capt. Charles C. Comstock. In addition, the following officers of the Medical Service Corps Reserve have been approved as members of the Group: Lt. Col. Lloyd K. Clark, Maj. Reuben Roseman, 1st Lt. Bernard J. Jandorf, and 1st Lt. Harold Z. Baumbach. Capt. John L. Bennett, Corps of Engineers Reserve, is also an approved member of the newly activated R&D Group. Numerous other officers of the Reserve components of the Chemical Corps, Medical Department, Signal Corps, etc., have submitted applications for membership and it is expected that these will be approved in the near future.

This Reserve unit has been organized in accordance with the provisions of Department of the Army Circular 127. The purpose of the Circular is "to provide a program for Reserve officers who are professionally engaged in research and development activities, in order to insure their optimum utilization in peace and war." The objectives of the program are as follows: "(1) Maintain the useful affiliation of this type of personnel with the Organized Reserve Corps; (2) Provide peacetime assignments for these officers, enabling optimum utilization of their education, experience, and skills; (3) Furnish mobilization assignments which will fully utilize their talents; (4) Adequately prepare these officers for mobilization." More than 25 Reserve R&D Groups have been activated to date.

Col. Greene has recently spent two weeks on active duty with the General Staff in connection with setting up Chemical Corps problems which are suitable for investigation by R&D Group members throughout the United States. Since very few members will have laboratory or experimental shop facilities available to them, most of the problems suggested by the Chemical Corps pertain to literature surveys; the review of technical manuals, specifications, drawings, and technical training literature; the derivation of theoretical concepts and mathematical formulas from evaluations of existing data; materiel and plant design suggestions, etc. A few problems, however, involve experimental work and are provided for those officers who do have facilities for such work. R&D Group members will receive inactive duty training credit for the time they spend working on problems approved by the General Staff.

Bell to Command 91st Chemical Mortar Battalion

Lt. Colonel Edgar V. H. Bell assumed command of the 91st Chemical Mortar Battalion, Army Chemical Center, Maryland, on 7 December, 1948.

The 91st which has consisted of only "A" Company since its move to Maryland from Ft. Lewis, Washington, last February, is being built into a full strength battalion.

Colonel Bell is an expert mortar man and is an experienced mortar battalion commander. He did an outstanding job as battalion commander of the 90th Chemical Mortar Battalion during its training at Ft. Bragg, North Carolina, and during its combat operations in the European Theatre.

The 91st Chemical Mortar Battalion was attached to the Second Infantry Division at Camp Swift, Texas, and Ft. Lewis, Washington, for two years before its move last February. With the Second Infantry Division the 91st participated in many training maneuvers, including "the Aliso Canyon Amphibious Maneuvers" off the coast of California in 1946 and the "Exercise Yukon" in Alaska in 1947 and early 1948. It distinguished itself as an efficient and well disciplined organization.

Lt. Colonel Andrew M. Dunn who is now with the Sixth Army Headquarters at the Presidio of San Francisco, commanded the 91st while it was at Ft. Lewis.

Documents Relating to the Capture of a German Gas Dump

By L. WILSON GREENE
Scientific Director, Chemical Corps Technical Command

Several reports and letters on file in the Technical Library of the Technical Command at the Army Chemical Center reveal the sequence of events leading to the capture and occupation of a large German gas dump and filling plant early in May 1945, a few days before V-E Day. These documents are of considerable historical interest to the Chemical Corps since this installation, the Heeresmunitionsanstalt at St. Georgen in the Black Forest, Bavaria, was the largest German toxic chemical facility captured by American troops. A Combined Intelligence Objectives Sub-Committee investigation team interrogated German officers in charge of the dump and learned that a strict order had been issued over Hitler's signature that no dumps of chemical ammunition were to be blown up because such action might lead the Allies to conclude that the Germans were resorting to gas warfare. Because of this order, and because the dump had suffered practically no war damage, it was captured intact.

The first document in the series is the following British intelligence report:

C. D. R. 5
ENEMY C. W. AND SMOKE
INTELLIGENCE SUMMARY
No. 71
(22nd March to 6th April, 1945)

EXTRACT

8. *Gas Charging Stations and Storage Depots.*

It is reported from PW and similar sources that Army Munition Depots at the following places have been concerned with charging and storing gas weapons (B.3):—

* * * * *

(g) *St. Georgen* (S. of Munich): 2000 employees worked in 12-hour shifts on gas charging of artillery shell, 250 kg. bombs and "Spruhbusche 39" (gas mines); 10.5 cm. shell were filled at the rate of 30,000 per day; these shell were painted with a green or a yellow stripe.

* * * * *

(Sgd) H. F. THUILLIER,
Major, R. E.
for Controller, Chemical
Defence Development

C.D.R.5 (Ministry
of Supply)
Savoy Hill House, W.C.2.
TEMPLE Bar 4411
Ext 32
AYS/PE/RRW
13th April, 1945.

The next document is the original memorandum (Fig. 1) by the Supreme Commander of the German troops in the Chiemsee area to the Commanding Officer of the St. Georgen dump, authorizing him to hand over the installation to the American troops.

Der Oberbefehlshaber
der deutschen Truppen im Raum Chiemsee
2.Mai 1945.

V o l l m a c h t !

Oberst Dr. M e y e r und Uffz. Dr. Z o t t e r sind von mir bevollmächtigt, ein Sondermunitionslager des Deutschen Waffenamtes im Raum Chiemsee an die amerikanischen Truppen zu übergeben.

Tolsdorff.
Generalleutnant

The Supreme Commander of the German
Troops in the Chiemsee-area
2nd of May 1945.

C e r t i f i c a t e

This is to certify that
Colonel Dr. M e y e r and Sgt. Dr. Z o t t e r (interpreter)
are authorized to hand over to the American troops an
Ammunition dump of the Deutsche Waffenamt containing special
types of ammunition which is situated in the Chiemsee-area.

Tolsdorff
Lieutenant General

FIG. 1

On 3 May 1945 there were three communications about this matter between the Third and Seventh United States Armies. These messages are reproduced below:

FIG. 2
Exterior view of Arsenical Storage Bldg. showing camouflage

FIG. 3
Interior of Arsenical Storage Bldg. Five tanks each of 100 cu. meters capacity are behind the windows, with a like number on the opposite side

HEADQUARTERS
THIRD UNITED STATES ARMY
G-2 Message File

Telephone) Report 0305208 May
Verbal Date and Time
TO See Distribution
FROM G-2, Third US Army.

Following report received from XX US Corps at 0305208 May:

Oberst Dr. MEYER appeared under a flag of truce to 13th US Armd Div with terms for surrendering a poison gas dump. Dr. MEYER is the same officer who negotiated the surrender of the gas dump Vic south of REGENSBURG. The officer states chemical dump of the DOUTSCHE WASSEMAMT is in the wooded area centered at (Z 625418) and contains the following poison gases:

Yellow cross, green cross, blue cross, and white cross.

Dump contains 5,945 tons of liquid LOST (Mustard), 12,000 tons of Hungarian and Italian LOST in ceramic containers and some in specially made barrels, 11,000 No. 2 gas shells of different caliber, 21,000 shells of French origin containing phosgene, 6,000 of Italian origin containing LOST, and 100,000 boxes of gas for spraying.

Representative states shells are arranged in Ammo Dump fashion. Further states area manned by 18-20 officers or Army officials under command of Capt. SCHOLZ, 30 gas specialists, 10 Corporals and 110 old men used as guards who have rifles of French origin. Oberst MEYER has authorization in the name of Gen. Lt. TOLSDORFF, Supreme Commander of German troops in the CHIEMSEE area, to negotiate surrender of area. Terms as follows:

1. German officers in area will not be regarded as PW and will be allowed to be returned to German lines.

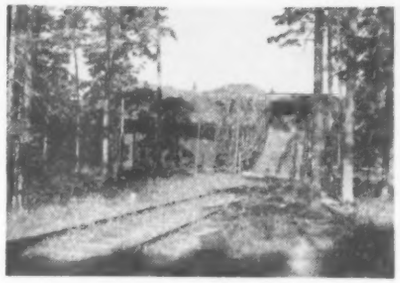


FIG. 7
Outside view of Bulk Mustard Storage Bldg. showing rail entrance

2. U. S. troops will not enter line of the danger zone until after 031400B.
3. German personnel will be in the fenced in camp area.
4. 7 outposts, each consisting of 1 gas specialist and 2 or 3 guards, will be placed along the North edge of the danger zone.
5. Area will be surrendered intact.
6. No fire to be placed on this area. (Danger zone is as follows: Area bounded by (Z 5540)—(Z 5845)—(Z 6545)—(Z 6939)—(Z 6933)—(Z 6231).

s/ J. L. DIETER, Capt Cav
for KOCH
AC of S, G-2

G-2 MESSAGE XV CORPS
FROM: Seventh Army—030905B

Tp msg received by Seventh Army from Third Army at 030900B: A poison gas dump is located in the following area: Z5540, Z5845, Z6545, Z6939, Z6933, Z6231. Contains the following: Yellow Cross, Green Cross, Blue Cross, White Cross. Furthermore, 5945 tons of liquid mustard, 12,000 tons of Hungarian and Italian mustard in containers or especially built barrels, 11,000 No. 2 gas shells of unknown caliber, 21,000 shells of French origin containing phosgene, 6,000 shells of Italian origin containing mustard, 100,000 boxes of poison gas for spraying.

The representative of the Commanding Officer of this dump came over under a flag of truce to "Toxic" with the following term of surrender:

1. No fire be placed on the area.
2. German officers in the area not to be regarded as PWs and be allowed to return to German lines.
3. US troops not to enter the danger zone until after 031400B.
4. The area to be surrendered intact, including the personnel in the area.

Three 7-man outposts and 2-3 guards will be placed at the N end of the gas dump.

The German negotiating officer is Dr. Meyer, the same officer who negotiated the surrender of the gas dump S of Regensberg. He has authority to negotiate and conclude the terms.

In view of the fact that this dump is located in our area, Third Army wants us to conduct negotiations. This German officer is now at the CP of "Comet."

DIST: 45th, 42d, 20th, 106th, Cav, G-4, CWS, 3d.

HEADQUARTERS
THIRD UNITED STATES ARMY
Office of the Chemical Officer
APO 403

3 May 1945

Memorandum for: Chemical Officer,
Seventh Army,
APO 758.

1. Report was received a few days ago that plants of GEORGE FARBEN known as MONTANWERKE or ANORGANA probably have stocks of poison gas capable of penetrating respirators. These plants are said to be in the vicinity of GENDORF and

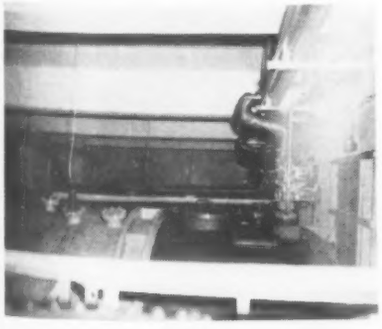


FIG. 4
Arsenical Storage Tanks

FIG. 5
Mustard Storage Bldg. Note dome-shaped roof

FIG. 6
Outside view of Bulk Mustard Storage Bldg.

FIG. 8
Bulk Mustard Storage Bldg.

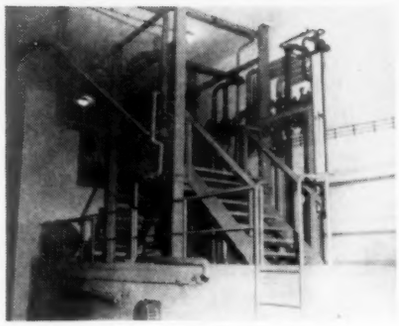


FIG. 9
Inside view of Bulk Mustard Storage Bldg. showing operating and control machinery

NEU OTTING (Z 6673). GENDORF is Southeast of NEU OTTING.

2. Information was received today that arrangements have been made for the surrender of a gas dump in the wooded area centered at (Z 625418) which is said to contain 5,945 tons of liquid Lost; 12,000 tons of Hungarian and Italian Lost, some in ceramic containers and some in specially built barrels; 11,000 #2 gas shells of different caliber; 21,000 shell of French origin containing phosgene; 6,000 shell of Italian origin containing Lost; and 100,000 boxes of gas for spraying. The danger zone of the area is stated to be bounded by (Z 5540), (Z 5845), (Z 6545), (Z 6939), (Z 6933) and (Z 6231).

3. The above information is transmitted in view of the fact that the areas in question are now in the zone under control of your headquarters.

(Sgd) E. C. WALLINGTON
Colonel, CWS
Chemical Officer

The Chemical Officer, 42nd. Infantry Division, sent a status report to the Chemical Officer, XV Corps, who in turn forwarded it to the Chemical Officer, Seventh Army, as follows:

HEADQUARTERS 42D INFANTRY DIVISION
Office of the Chemical Officer
APO 411 U. S. Army
6 May 1945

Subject: Investigation of German Army Chemical Warfare Dump and Installation in the vicinity of SANKT GEORGEN, GERMANY.

To: Chemical Officer, XV Corps.

1. The installation reported by the German Army intermediary, Colonel Dr. Meyer, was located in the area of the ST. GEORGEN FOREST indicated on the map, INCL #4, at approximately 041800 May 1945. The area was intact with the exception of destruction and looting of offices and barracks, apparently by non-military personnel. All German military personnel, with the exception of one NCO, had left or had been taken prisoner. The NCO reported one German officer and nineteen enlisted specialists had been taken prisoner. A brief inspection of the area showed the vital gas installations to be unmolested.

2. The area was found already secured and guarded by a unit of the 20th Armored Div, which unit was relieved immediately by a unit of the 42nd Inf Div. The 21st Cml Decon Co arrived 5 May '45 to conduct gas security as ordered.

3. On 5 May 1945 the intermediaries, Col Dr Meyer and Sgt Dr Zotter, and driver and vehicle were taken south to the area of the Third Division to locate the area for passage through the lines. When confronted with the news of the advances of the Allied Armies to the south in the last known areas of their own CP's, the Col, Sgt, and driver elected to surrender to the American Army rather than seek their own lines and forces. They were then turned over to the Provost Marshall, 42d Inf Div for processing.

4. A verbal report on the arrangements was made immediately to the Chemical Officer, XV Corps, and CG 42d Inf Div.

(Sgd) H. H. GRICE
Lt Col CWS

1st Ind.

HQ XV CORPS, Office of the Chemical Officer, APO 436, US Army, 6 May 1945.

TO: Chemical Officer, Seventh US Army, APO 758, US Army. For your information.

(Sgd) LLOYD E. SWEARINGEN
Colonel, CWS
Chemical Officer

The following reports describe the St. Georgen facility and the operations conducted there. A detailed inventory of munitions and bulk chemicals, comprising more than 200 items, was made by the 21st Chemical Company (Decon.).

HEADQUARTERS SEVENTH ARMY
Office of the Chemical Officer
E.E.I.S.T. No. 4
APO 758 U. S. Army
9 May 1945

Subject: Captured Gas Depot and Filling Plant

To: Chemical Officer, Headquarters Seventh Army APO 758, US Army.

CWS-E.E.I.S.T. No. 4—Report No. 41 Preliminary Report of St. Georgen Gas Filling and Storage Plant

INTRODUCTION

This team inspected the St. Georgen gas filling and storage plant located at GSGS 4416 Germany sheet X-7 Salzburg Z 617-412.

HISTORICAL

This installation was put into operation until taken by our forces. Only very slight damage was done by bombing or shelling.

LIST OF PERSONALITIES

Capt Scholz was commandant of

FIG. 10
Inside view of Bulk Mustard Storage Bldg. showing dome-shaped roof of building and tank

FIG. 11
Inside view of Bulk Mustard Storage Bldg. showing glass observation window on top

FIG.12
Outside drum storage of mustard

the installation and Capt Knoll was in charge of all gas mixing, filling and technical matters. Three high-ranking non-coms, two of which are chemists, were our guides and gave us the following information. These non-coms are still present at St. Georgen assisting the 21st. Decon. Co. in whatever way needed. Their names are as follows:

Ofw. Maurer	Chemist
Ofw. Kalex	Chemist
Fw. Seitz	In charge of Mustard mixing plant

Capt Scholz and Capt Knoll were taken prisoners and their present whereabouts are unknown.

LIST OF RAW MATERIALS AND SOURCES

All gases were received from outside sources, mostly from Bad Breslau,—S wax came from I. G. Farben-prepared gases ready for filling into shells came from various countries such as Hungary and Italy.

DISCUSSION OF MIXING AND FILLING PROCESSES

Mustard was stored in 4 large 1,000 ton containers built similar to a large thermos jug so that in case the container was hit by a bomb, the outside container would still hold the escaped mustard. From here the mustard moved through underground pipes, by vacuum, to the mixing and filling plants. At the mixing plant, there are ten hot mixing machines for preparing thickened mustard (or Summer Lost). The proportion is 90% mustard, 7% S Wax, and 3% polystyrol. S Wax appears to be bleached montan wax (I.G. wax) previously found manufactured at I. G. Farben, Gersthofen. (See CWS-EEIST No 4—Report No. 38.)

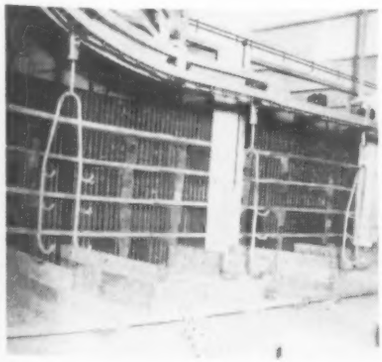


FIG. 13
Empty shell storage, filled with 105 mm. shell. Note shell handling equipment in foreground

The cold mixing machines (4 in all) are used for mixing mustard and PD in the proportion of 1:1. These mixing machines have a capacity of 2 cu. meters, but operate at less than 2000 liters. In the hot process, the thickened mustard is kept at 80° C. while filled into shells. The filling plant is adjacent to the mixing plant. The filling plant has 3 full automatic Hagenuk filling machines with a capacity of 200-300 shells per hour. There are also 6 semi-automatic filling machines with almost the same capacity, but requiring more men to operate them whereas the full automatic machine requires but one man. Throughout this system there is extensive apparatus for the recovery of mustard fumes and final extraction. All shells are handled by a conveyor system. The laboratory used in conjunction with the mixing and filling plant was used for physical control tests in agents. No research was done here.

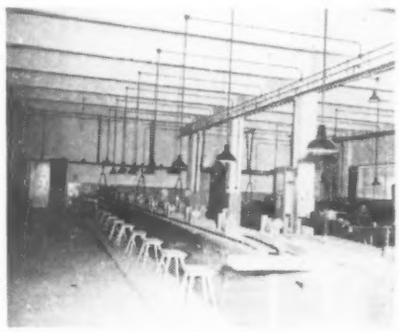


FIG. 14
Shell Cleaning Line

TYPES AND DISPOSITION OF GASES

There were drums of Hungarian mustard which ran from 25% to 50% $CC1_4$ mixed with mustard. Another type of Hungarian mustard was mustard and diphenylchlorarsine in varying proportions. Of both types there were some 20,000 drums. Both types were used as Winter Lost. These were filled directly into shells without further mixing. There were various types of shells found at St. Georgen, none of which were new to this team. Among them were 1 green ring, 3 green rings, 2 yellow rings—Sprubruchse, and 1 blue ring. Of some 87 bunkers, there are roughly some 200,000 to 300,000 gas shells. (Inventory of the same is now in the process of being made by the 21st Decon. Co.) An interesting sidelight on 3 green ring shells is that it was considered secret at St. Georgen, but the chemists surmised it to be a cyanide derivative, blood and nerve gas, non-vesicant.

Ample methods for decontamination such as Engiftungstoff 40 and N; also various types of protective clothing and equipment were about the premises.

CONCLUSIONS

None.

RECOMMENDATIONS

None.

(Sgd) LOUIS NAGY
1st Lt. CWS
CWS-EEIST #4

HEADQUARTERS 7th ARMY
Office of the Chemical Officer
E.E.I.S.T. No. 5
APO 758 U. S. Army
14 May 1945

Subject: Captured Gas Depot and Filling Plant

To: Chemical Officer, Headquarters Seventh Army, APO 758, U. S. Army

CWS-E.E.I.S.T. No. 5—Report No. 5
St. Georgen Gas Filling and Storage Plant

INTRODUCTION

Following a preliminary examination and report by CWS-EEIST No 4 (Report No 41) this team, EEIST No 5 made a further examination of the dump and filling plant. This dump is located near the town of St. Georgen (about 2 km SE) in a wood.

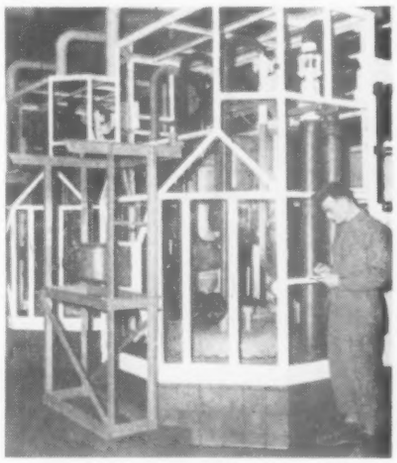


FIG. 15
Hot Mixing Tanks

Map location GSGS 4416 Germany sheet X-7 Salzburg Z 617-417. It covers an area about 8 km in circumference.

HISTORICAL

This plant was started in 1939 or 1940 and was in operation up until a few days before our forces took over. Construction was still going on or planned as some buildings shown on the enclosed map do not exist although shells are some times piled in these locations. The dump and filling plant are intact except for pillaging done by Russian troops who entered the area before our forces took over. About 1000-1500 persons were employed here, mostly Germans with some French and Czechs.

LIST OF PERSONALITIES

The only one of the prisoners referred to in the preliminary report who was interviewed was Ofw. Maurer who conducted this team through the area and explained the processes.

LIST OF RAW MATERIALS AND SOURCES

No chemicals were manufactured at this place. All chemicals were received from outside sources and it appears that some filled munitions must have been received here since according to the PW only mustard was filled here. Quantities of 3 green ring shell were on hand as well as some Italian WP shell.

"D" Lost Levenstein mustard was obtained from Gendorf and "O" Lost (Thiodiglycal mustard) was obtained from Ammendorf. A large amount of mustard mixed with carbon tetrachloride was present in drums stored in the woods. This was shipped in from Hungary. Nitrogen mustard was shipped in from an unknown source. Three green ring (blood and nerve poison) was obtained from Breslau. No information could be obtained as to the source of the arsenicals. Clark I (diphenyl chlorarsine), Clark II (diphenyl cyanarsine) and phenyl dichlorarsine were present in considerable quantity.

Quantities of explosives such as TNT and potassium chlorate for use in filling bursters were on hand.

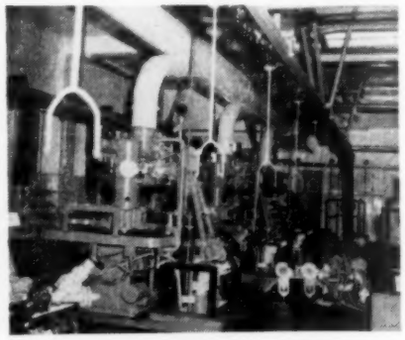


FIG. 16
Hot Filling Machine used for filling Sprukbuckse 10-liter land mines

DISCUSSION OF MIXING AND FILLING PROCESSES

Agents as received are either stored in the open (drum storage) or in one of seven large storage buildings. Six of these buildings are identical and are for the storage of mustard. The seventh is used for the storage of arsenicals. All buildings are built in such a way that tank cars or flat cars may be run in for unloading. A truck entrance is also provided. These buildings are built of heavy concrete covered with earth and grass. In addition, they are well camouflaged with wire nets.

Arsenical Storage

Upon entering the arsenical storage building a large room is observed. Entry is made on a catwalk about

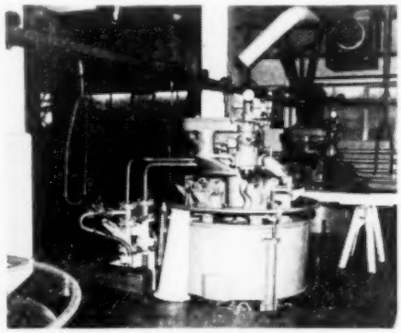


FIG. 17
Semi-Automatic Filling Machine

half way up so one looks down into a sort of well. The storage tanks are located behind walls around the sides of this room. Windows are provided as well as peep holes into the tanks so that the quantities in the tanks may be observed. There are ten tanks in all in this building, five on each side. Each tank holds 100 cu. meters. The tanks are provided with a means of heating and necessary valves for filling and emptying.

Mustard Storage

The outside appearance of the mustard storage building is very similar to the arsenical building except for a dome shaped roof. These buildings are also provided with a railroad track for unloading tank cars. All seven buildings are in line on the same spur.

Storage of mustard is in a large vertical dome shaped tank about 25 to 30 feet high and about the same

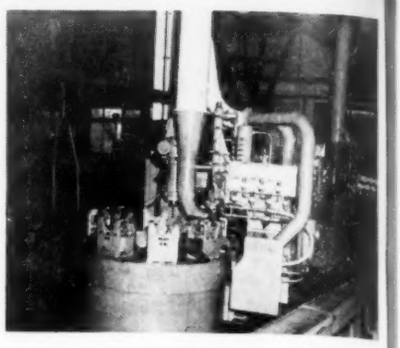


FIG. 18
Automatic Filling Machine

diameter. The tanks are made of special glass tile. Each tank was provided with two glass observation windows about 3 feet in diameter. No information could be obtained as to the thickness of the walls of the tank, but it was sufficient to withstand the vacuum necessary for transfer of the mustard. The tank was housed in a concrete room also dome shaped and with about 6 feet clearance all around. The concrete roof was of a sufficient thickness to withstand light bombs. In a separate room behind heavy steel doors the operating mechanism was located.

Pump House

All of the above referred to tanks are connected to the pump house, which contained 4 tanks, each holding 17 cu. meters. Arrangements are made so that any agent can be drawn from any of the large storage tanks to smaller storage tanks in the pump house where they can be further directed to any of a number of mixing tanks and probably directed to the filling plant. All pumping is done by vacuum to lessen the possibility of any leakage.

Mixing Machines

In this building there were 14 mixing machines. We were informed ten were for hot mixing and four for cold mixing. These machines have a ca-

FIG. 19
Exterior view of Storage Bunker

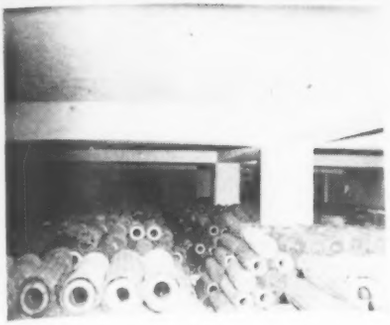


FIG. 20
Interior of Storage Bunker. Each bunker holds 3000-4000 105 mm. shells

pacity of 2 cu. meters each. The hot mixing machines are provided with means for adding previously weighed amounts of the thickening agents. The temperature is kept at about 70° C. The mixture used was

90% Mustard
7% S-Wax (Bleached Montan)
3% Polystyrol.

The cold mixture consists of

50% Mustard
50% Arsenoil, a mixture of 90% phenyl dichlorarsine together with 2-3% $AsCl_3$ and impurities.

Filling Operations

Shells for filling were received from a large storage building. Before filling they were cleaned and polished in a separate building. Special conveyors handled the shells from one building to another through underground passage ways.

There were two separate filling rooms. In one, only cold filling was done. In the second, only hot filling was done. The cold filling room had three full automatic machines with a capacity of 200-300 shells per hour and six semi-automatic machines with a capacity of about 120 shells per hour per machine. Normally operations were carried out about ten hours per day with a half day on Sunday.

FIG. 21
Outside storage of 105 mm. Green Ring I Shell

The hot filling room had four semi-automatic filling machines with a capacity of about 120 per hour per machine. According to the PW these machines were only used for filling land mines (Sprukbuckse).

From the filling machines the shells were transferred to a testing room where they were tested for leaks in a vacuum drum and finally to a painting and marking room.

Storage

Finished shells were stored in concrete earth covered bunkers (similar to an igloo) storage buildings, or in the open. There are 70-80 of these large bunkers about 90 feet by 35 feet with a capacity of 3000-4000 105 mm shells.

Other Facilities

The dump is provided with adequate railway facilities and has its own locomotives. Power, water, and machine shops are available. A small control laboratory is located in the building (housing) the water disposal plant. All process water is treated with caustic and chlorine before emptying into the river.

Complete facilities for personal decontamination of employees are provided, both male and female. The bath house for men is provided with dressing rooms, showers, and a complete laundry. Facilities for the storage of clean working clothes and protective clothing are available. Quantities of all types of protective material necessary are on hand. The buildings are of concrete and in most cases have tiled floors and walls up to about 6 feet.

All machinery is the most modern and up to date. All pipes are painted a separate color to indicate their content as well as indicating direction of flow.

INVENTORY

Inventory of the dump by the 21st CmlC is now in progress. An estimated 200,000 to 300,000 filled shells are in storage as well as some 20,000 drums. These drums are for the most part 56 liters drums but there are a number of 55 gal. drums. The content of all the drums has not been determined, however, some are known to contain arsenicals and others have mustard mixed with carbon tetrachloride. The proportions of the latter vary from 65% mustard, 35% CCl_4 to 85% and 15% of the same chemicals. No new agents or shells had been uncovered up to the time this inspection was made.

FIG. 22
Storage of Sprukbuckse 10-liter Land Mines. There are about 32,000 stored in this building. Note conveyor in foreground

RECOMMENDATION

Due to the size of the installation and the quantity of material on hand it was impossible to make a complete survey of the installation. Since the plant is in perfect operating order and the machinery is very efficient and modern it is suggested that some members of the Technical Division OC CWS or the Manufacturing Arsenals inspect the filling plant.

s/ PERCY A. LASELLE
Major CWS
EEIST No 5

JJH/EJW/jhk

HEADQUARTERS 7TH ARMY
Office of the Chemical Officer
APO 758 U. S. Army

29 May 1945

323.—CW

Subject: St. Georgen Gas Filling and Storage Plant.
Through: Chemical Officer, Headquarters Twelfth Army Group, APO 655, US Army.
To: Chief, Chemical Warfare Officer, ETOUSA, APO 887, US Army. (Att: Chief, Intelligence Division)

1. Reference letter this office, subject as above, file #402.5—CW dated 24 May 1945.

2. Since submission of above men-

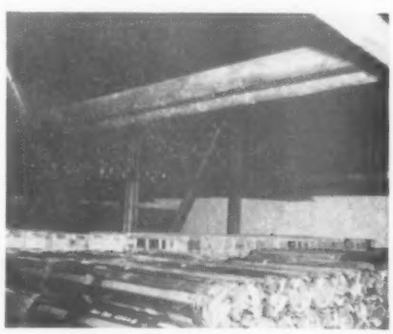


FIG. 23
15-C.M. Nebeliwerfer shell filled

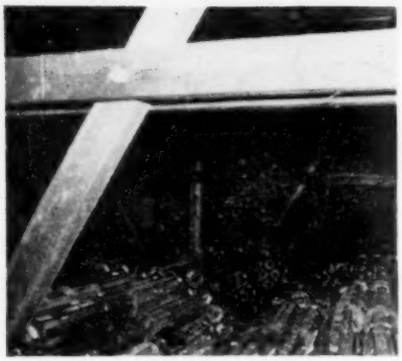


FIG. 24
Storage of 15-C.M. Nebelwerfer, Green Ring I shell. There are 15,000-18,000 shells in this building.

tioned report, the following additional inventory has been received:

Bldg. No.	Materiel	Amount
12	Polystyrene	630x200 Kg Casks (Approx 120 tons)
12	S-Wax	700x100 Kg Casks (Approx 70 tons)

3. The above material was used in the mustard "hot filling" process described in reference report.

4. "S-Wax" described is believed to be MONTAN WAX (see par 13 a CDR 5, Enemy CW & Smoke Intelligence Summary No. 73, dated 22 April-6 May 1945). It is to be noted that CWS-EEIST No. 4 Report No. 38 on I. G. FARBEN, GERSTHOFFEN, states that seven hundred (700) tons unbleached and one hundred twenty (120) tons bleached MONTAN Wax are on hand in this factory.

5. This is also to advise that HAUPTMANN HANS KNOLL, former technical director of the ST. GEORGEN HERRENSMUNTION-SLAGER Filling Plant now resides at ALTENMARKT-79½A (approximately eight (8) kilometers north west of St. GEORGEN on Route 304) and is available for consultation.

s/ JAMES J. HEFFNER
Major, CWS
Acting Chemical Officer

cc: G-2, 7A
Cml O, 3d Army
File

1st Ind
OFFICE OF THE CHEMICAL OFFICER, Hq 12th Army Group, APO 655, US Army, 31 May 45.
TO: Chief Chemical Warfare Officer, Hq ETOUSA, APO 887, US Army. (Attn: Intelligence Division)
Forwarded.

s/ A. LEGGIN
Lt. Colonel, CWS
Chemical Officer

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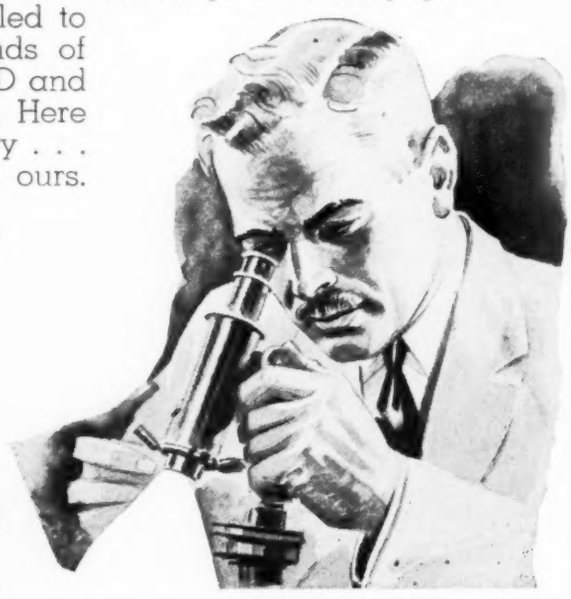

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Porcelain enamel — Chemicals — colors — Glass colors — Pottery colors — glazes — bodies.

Sets Pace for Extension Courses

1st Lt. Alfred D. Reed, Cml Res, has one of the most outstanding records of achievement in the Extension Courses according to reports received from Army Field Forces. Lt. Reed enrolled in Army Extension Courses of the Chemical Corps School on 26 February 1947. He has completed all available 30- series subcourses and, in addition, he has reviewed the materiel subcourses of the 20- series; and, due to his intense interest, an exemption has been granted and 40- series subcourses have been made available to him. Lt. Reed's record of completing 16 subcourses in 20 months, with 283 total credits and a numerical average of 94.3 percent, is exceptional. In order to obtain a rating of superior in extension courses, 95 percent is required. He received a superior rating on 8 of the 16 subcourses. Listed below is his outstanding record:

S/C No.	*Title*	*Course Rating*	*Credits*
30-1	Administration II	94.9	21
30-2	Map and Aerial Photograph Reading II	88.8	20
30-3	Estimate of the Situation and Combat Orders II	86	18
30-4	The Chemical Mortar Company	87.4	21
30-5	Chemical Corps Service Units	99.6	19
30-22	Military Boards and Investigations	98	21
30-25	Signal Communications for All Arms and Services	98.2	20
20-1	Chemical Agents	98.4	18
20-2	Chemical Materiel	95.2	18
20-13	Materiel—Flame Throwers and Flame Thrower Fuels	99	12
20-17	M2 Mechanical Smoke Generator	98.3	11
20-18	Tactical Employment of Chemicals I (War Gases)	90.6	16
40-4	Rules of Land Warfare	93.9	16
40-5	Military Government	96	20
40-6	Chemical Mortar Battalion I	91.2	15
40-9	Counterfire Organizations and Techniques	93.9	17
		Course Average 94.3	
		Total Credits 283	

Lt. Reed was born 3 February 1912. He attended the Massachusetts Institute of Technology and completed three and a half years of a course in Electro Chemistry. He entered on duty as a 2nd Lt, 7 September 1942, and attended the 3rd Combined Basic & Troop Course at the Chemical Corps School. Following his graduation at the School, he was assigned as a Platoon Leader at the 1st Separate Training Company, Edgewood Arsenal. In December 1942 through August 1943, he was a member of a Guard and Security Detachment and, as such, convoyed gas to England and North Africa. In October 1943, he became a Platoon Leader in the 2nd CWS Training Regiment and was promoted to 1st Lt. 1 January 1944. He served with this Training Regiment to September 1944, when he became Chemical Officer of a Tank Destroyer Replacement Training Center. From December 1945 to March 1946, he served as Executive Officer of Company D, 26th Training Battalion, 3rd Regiment IRTC. Lt. Reed now resides in Providence, Rhode Island, at 114 S. Angell St.

1st LT. ALFRED D. REED, *Cml. Res.*

Lt. Reed is to be commended for his especial efforts and, in view of his achievements to date, will have no difficulty in meeting the requirements for promotion as pertains to completion of the extension courses of the Chemical Corps School.

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Any person who is or may be assigned or detailed to duty with or in the Chemical Corps, whether as officer, warrant officer, enlisted man or civilian employee, or who has been honorably discharged from such duty, and any person interested in the promotion of chemical warfare preparedness for national defense, may upon approval of the Executive Committee and payment of the annual dues hereinafter specified become a Regular member of this Association.

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TO: FRED M. JACOBS, Secretary, Armed Forces Chemical Association
1129 Vermont Avenue, Washington 5, D. C.

I hereby apply for membership in the ARMED FORCES CHEMICAL ASSOCIATION. Inclosed herewith is check or money order in the sum of:

Regular membership $5.00	☐	Student Membership	$ 2.50 ☐
Group membership $100.00	☐	Life Membership	$100.00 ☐
		Sustaining Membership	$500.00 ☐

Of the sum remitted for dues, $2.00 is for the annual subscription for the Armed Forces Chemical Journal, and $.50 is for the annual subscription for the Armed Forces Chemical News.

I am a citizen of the United States of America with a deep sense of the obligation of every citizen to devote himself unstintingly to the cause of our nation's defense whenever the need arises. I have a particular interest in the Chemical phase of national defense.

Military affiliation or CWS activity, if any, in World War II.....

Name.....

Address.....

City.....

Development of the 4.2 Chemical Mortar

PART II. STANDARDIZATION AS M2

By GEORGE A. MILLER*
Technical Command, Army Chemical Center

Further Development

With three important exceptions, the development of the 4.2-in. Chemical Mortar proceeded in small increments; a little was added here and a little there, and each increase in range had to be paid for in redesign of the components to provide increased strength and usually increased weight. The first exception to this step-by-step procedure, as mentioned in the preceding article, was the rifling of the barrel. Over 1,000 yards, or about 125 percent, were added to the range by this single improvement. The second increase in range was accomplished by increasing the propellant charge giving an increase of 800 yards or 3200 yards maximum. The third exception, to be described below, was a change in the design of the propellant powder. In this case the range jumped about 1300 yards, or from 3200 to 4500 yards.

Mortar Assembly MIA1

The components of the MI mortar assembly, standardized in June 1928, have been mentioned. The second assembly, standardized as MIA1 in February 1935, included an E17R3 barrel (MIA1), an E11R11 baseplate (MII), and an E6R5 standard (MI).

*Mechanical Engineer, Munitions Division, Technical Command, Army Chemical Center, Md.

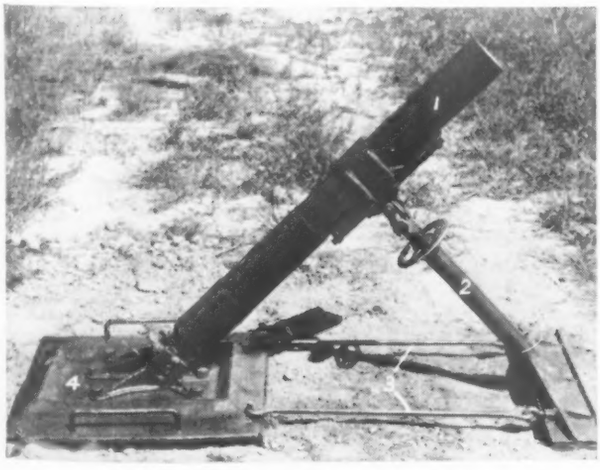


FIG. 30
Early Standard Assembly of 4.2-inch Mortar. 1—Barrel. 2—Standard. 3—Tie-rods. 4—Baseplate

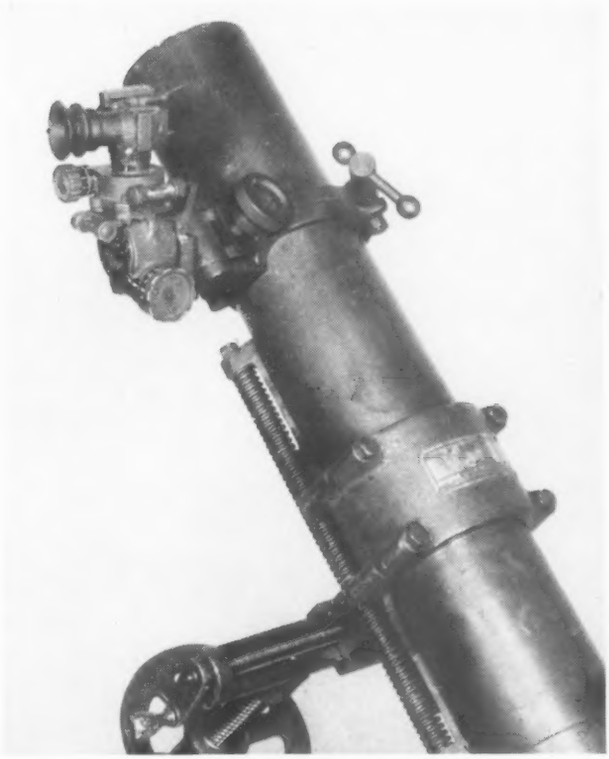


FIG. 29
Experimental Spring Shock Absorber

The first ten models of the barrel were made from Stokes Mortar tubes and differed mainly in the design of the rifling. Barrel E11, rifled in accordance with the accepted E3 model, was the first to be made especially for the 4.2-in. mortar. It was heat-treated to show a minimum elastic limit of 100,000 pounds per square inch. Subsequent models were concerned with external features of design. Prior to 1930 a rigid connection between the standard and barrel was employed. Frequent breaking of this connection due to the recoil of the barrel led to experiments with spring shock absorbers (Fig. 29). Barrel E17R3 appeared to be satisfactory as far as the spring relief features were concerned, and was used in many tests as late as 1942. The tube was forged from seamless drawn nickel steel tubing, swaged in at the breech in lieu of a tube cap; the base cap with barrel pin was screwed onto the narrow swaged end after first inserting the firing pin. A removable tube cap to facilitate rifling, and a two-piece base cap to facilitate removal of the firing pin, were the only subsequent changes in design. Pressures as high as 13,500 pounds per square inch and a muzzle velocity of 672 feet per second were obtained with the MIA1 barrel without evi-

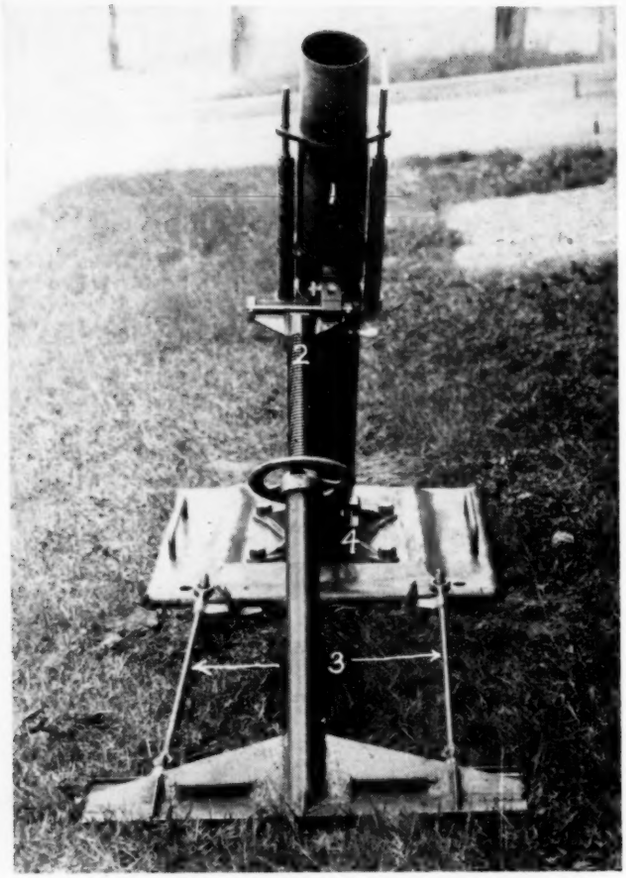


FIG. 31
4.2-inch Chemical Mortar M-I. 1—Barrel. 2—Standard. 3—Tie-rods. 4—Baseplate

dence of failure or distortion. Fig. 30 shows the assembled mortar at approximately this period.

Success with a rifled barrel left no doubt that a weapon of heavy fire power was in the making. Was such fire power compatible with the mobility and ease of handling which were the prime requisites of a mortar for chemical troops? This question could only be answered after long and patient experiments with various designs of the supporting baseplate. An improperly supported mortar will jump a foot or more at each firing. To prevent this, it was at first thought necessary to dig a hole several feet deep for the baseplate, and another hole for the bipod supporting the muzzle end of the barrel. This method naturally held the supports in place and made it possible to use designs of lighter weight than could be used on the surface, but involved expensive and time-consuming labor for each emplacement. Due to the weight limitations imposed at that time, much difficulty was encountered in finding a baseplate which would hold up under the recoil even when anchored at the bottom of a hole. Following the first dug-in types, which were unsatisfactory as to durability, a baseplate in the form of a truncated pyramid was made of alloy steel weighing 100 pounds. To add to the stability on soft ground a sub-plate of 2-inch wood planks was used. Flanges and outriggers were added but were either too heavy or lacked strength. Eventually the dug-in types were all abandoned in favor of surface-type assemblies. Forged alloy steel plates 28 inches square were used with the edges bent forward in the form of a lip to check horizontal movement of the plate. The E11 series, used in the MIA1 assembly, added a welded V-shaped rib on the under side. Model E11R11, with the apex of the rib to the rear, was the standard design for seven years and, in fact, was not substantially changed in the ultimate M2 assembly. Early restrictions on the weight of the baseplate were finally waived after much futile effort to attain stability; a weight of 150 pounds was permitted for the model just described. Handle bars were provided, making the plate readily transportable by two men. Subsequent changes to increase the strength of the baseplate ultimately increased the weight to 175 pounds.

The original bipod support, which was used with the Stokes mortar barrel, was retained for a while with improved steel elevating and traversing screws, but was found to be unnecessarily awkward and was replaced eventually with a design having a single pedestal. One of the important lines of effort was the discovery of the proper way to connect the standard to the baseplate, a very necessary provision with the surface setups of the mortar. Rods and chains and even flexible methods were tried; experiments are recorded of attempts to replace the standard with guys. Rod connections proved to be the most dependable and continued in use through the final development. The E6R3 standard consisted of a hollow steel upright with a cross piece at the top and wide spade section welded to the bottom (Fig. 31). Traverse of the barrel was provided by the horizontal screw on the cross piece; ele-

FIG. 32
Fuze M-2

vation was effected by turning the elevating wheel. This model was standardized as MI in February 1935. It is still designated MI but has received an important modification in the form of a recoil spring which permits the elevating screw to telescope downward in the standard at firing. Measurements had demonstrated that practically all of the motion of the supports in normal soil is downward and rearward. This causes a movement of the entire assembly, which with a rigid upright standard, causes a perpendicular displacement of the barrel. Subsequently, as the shell leaves the muzzle, it is given a whip which causes yaw and, in some cases, tumbling. At least 90 percent of the tumbling due to this so-called "whip" action of the muzzle was eliminated by the recoil spring in the standard.

The Fuse

The necessity of a delay in the arming of the fuse until the shell had left the muzzle of the barrel led to numerous variations in the design. As mentioned above, some of these were too complicated and hence reverted to a modification of the original Mark XI type which was standardized as MI in 1930. The delayed-arming feature consisted of a projecting "fork" which was thrown outwardly by centrifugal force until it reached the bore of the gun. Being held at that point it prevented the striker pin from aligning with the primer until the shell left the muzzle. At this point the fork was thrown clear of the muzzle and the fuse was armed. The flying fork was later considered to be a hazard to nearby personnel and, since the ejected forks were found as far as 100 feet from the mortar, there was ample reason for assuming that the projectile emerged from the gun before the fork had time to reach the bore. In the M2 fuse a brass "slider" was substituted for the fork and was made short enough to be retained in the body of the fuse; provision was made for holding it rigidly in the armed position as soon as that position was reached. In the old fuse the striker pin was held in safe position only by a shear wire after the safety pin was removed. In the new fuse the striker pin was held by a shear wire and also by steel balls which could only be displaced by the setback in firing. In the attachment of the burster tube and in the shape and general principles of operation, the old and new fuses were quite similar.

Both the M2 and M3 fuses were standardized in 1942 but have since been replaced by fuses M8 and M9 which incorporate additional safety features but are otherwise identical in appearance and functioning to the original models (Figs. 32 and 33). Fuse M8 is a component of the liquid-filled shell and consequently is attached to a long burster extending the length of the shell body. Fuse M9 is used with the high-explosive shell and is consequently attached to a short "booster" for detonation in place of the long burster. Except for the burster or booster attachments there is no difference between the M8 and M9 fuses.

Mortar fuses have also been developed with delay and time features. A 0.15-second delay was desired on high-explosive shell to permit some penetration of the target before functioning. This development was still in progress at the time the chemical mortar was turned over to Ordnance. A fuse adjustable for either superquick or time functioning was constructed by attaching an Ordnance M54 fuse to the shell body by means of an aluminum adapter. The booster tube for detonating the HE filling of the shell is threaded into this adapter. The time setting is between 0 and 25 seconds and is applied whenever air burst of the shell is desired. Because the 25-second time setting is below the time required for the full flight of the shell at maximum range, a slightly modified version of the fuse was developed which increased this time to 35 seconds; this feature however is not standard. The time and superquick fuse was standardized with the designation M5 (Fig. 34).

The Sight

Sighting the Stokes mortar was accomplished by means of a luminous stripe along the barrel

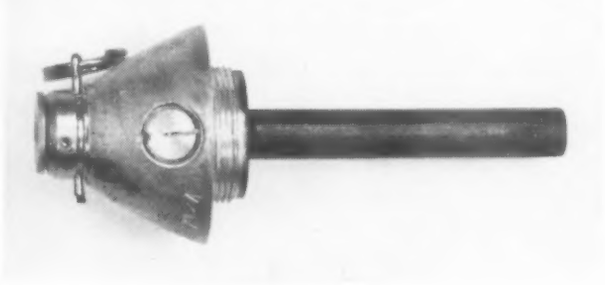


FIG. 33
Fuze M-3

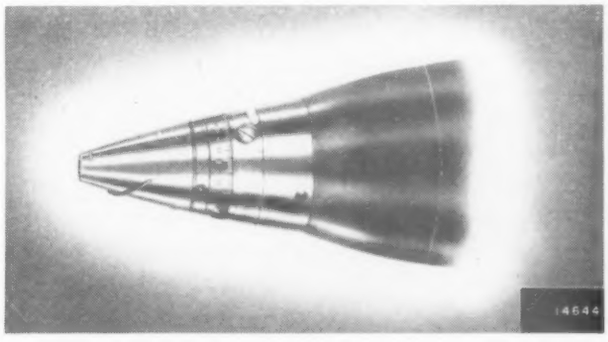


FIG. 34
Fuze M-5

FIG. 35
Sight E-1

and a clinometer to measure the elevation. This method was no longer accurate enough for the increased ranges of the 4.2-in. mortar. The first sight, E1, was a prismatic telescope on a bracket (Fig. 35), the legs being held against the barrel and the bubble used to check horizontal alignment. The construction proved too delicate. A sight was borrowed from the Ordnance Department with angle telescopic sighting arrangement adjustable for both azimuth and elevation; it was found too heavy to withstand the setback. Sight E4 was graduated for elevation and deflection as in the other sights, and was equipped with a convex mirror enabling the operator to stand at one side of the gun and lay the piece by observing the aiming stake reflections on the face of the mirror. An open sight was later substituted for the mirror (Fig. 36). A variation of this became the MI sight. Since it was held rigidly to the barrel by a bracket and was frequently damaged during the firing, a model was designed which rested on the barrel while laying the mortar and was removed before firing. This sight, considered accurate enough for smoke and gas, became the MII in 1936 and was considered part of the MIA1 mortar assembly (Fig. 37).

When the range of the mortar was increased to 4,500 yards in 1943, any inaccuracy in the sight was correspondingly magnified. A requirement also arose for a sight that would provide means of laying the mortar in direction when using any aiming point that could be seen from the mortar position. New military characteristics were prepared and given to the Ordnance Department to govern the design of a new sight. The result was a removable sight with an elbow telescope; the mount was designated M59. It is shown in Fig. 29, cited above, and also in Fig. 38.

Propelling Charge

As mentioned above, the earliest propellants such as Hivel, Oval, and Infallible, were hygroscopic and therefore had to be loaded in airtight containers on the rear of the shell. On 21 December 1921 a cooperative development between the Ordnance Department and Chemical Warfare Service for Stokes mortar propellant was authorized and outlined. Proof firing of the new powder was conducted at Aberdeen Proving Ground in the following year. Compared to Hivel No. 2 it showed from 0.3 to 0.5 yards per grain greater range as the powder charge increased. Since it was the only nonhygroscopic propelling powder, and since it gave the highest muzzle velocity, the lowest pressure per grain of powder, and the least flash, it soon was given sole consideration for use with the 4.2-in. mortar. It is a translucent to opaque double-base powder with about 13 percent nitrogen in the nitrocellulose. The first disks were cut round, about 2½ inches in diameter, and 0.014 inch thick. A hole was cut in the center, which enabled the disk to be slipped over the tube or "cartridge container" projecting from the base of the shell. The round shape was changed to square eventually in order to avoid the waste in cutting. Thereafter the grains were supplied in squares, 2.2 by 2.2 inches and 0.0125 inch thick, with a circular hole 1.35 inches in diameter in the center. The maximum charge for one round was 8 increments (an "increment" consisted of two squares sewn or stapled together) and this was standardized with the designation MV in 1934. Fig. 39 shows the appearance of the increments before being attached to the shell.

After the increments of powder are slipped over the cartridge container (facilitated by a slit in the increment which enables it to be straddled over the container), they are held in place by a clamp. A waterproofed 12-gage shot-gun type of ignition cartridge is inserted in the container. To fire the mortar, the shell is simply dropped in the muzzle of the inclined barrel; the force of gravity draws it down the tube until the firing

pin which is fixed in the base of the barrel makes contact with the primer in the end of the cartridge.

Increasing the Range

With the start of World War II, the need to increase the range of the mortar grew more imperative. In the spring of 1942 tests were conducted to discover the effect of adding four increments of powder to the standard 8-increment charge. It was found that the maximum range could be increased from 2,400 to 3,200 yards by this means, but that the barrel pressures were much increased and became excessively high with more than 12-increments. In June, tests were conducted at Indian Head, Maryland, by Section H, Division A of the National Defense Research Committee at the request of the CWS to obtain data on the behavior of the mortar when using more than the normal number of increments of powder. In these experiments the charge was increased to as high as 15-increments and maximum ranges of 3,820 yards were obtained. The pressure for this condition was as high as 17,000 pounds per square inch in the tube (by copper-ball pressure gages), with muzzle velocity of 640 feet per second. Travel and velocity of the projectile in relation to time were obtained by photographing a long tapering stick loosely fitted to the nose of the shell. The stick was painted white, with ½-inch black bands painted at intervals of 6 inches, and was photographed against a dark background with a Hickman high-speed 8-mm. camera. The authors reporting these tests, after a study of the plotted pressure-travel and velocity-travel curves, concluded that the muzzle velocity approached a limiting value for increasing amounts of propellant.

A 12-increment propellant charge was standardized in January 1943, and while higher grade steels were being specified for the latest barrels, it was apparent that 3,200 yards was close to the safe limit obtainable under the existing conditions. But much higher ranges were desired. Further increase in range could not be obtained by increased propellant charge without building up excessive pressures. The answer to the problem was fortunately close at hand. Lt. A. R. T. Denues, a CWS officer, had meanwhile undertaken a continuance of the work reported above at Indian Head in cooperation with representatives of the NDRC and the Navy Bureau of Ordnance. Using the measuring apparatus previously developed, and experimenting only with available equipment, the work was directed toward exploitation of various means of reducing barrel pressures with a given charge. If successful, it might be possible to augment the charge to produce higher velocities without exceeding established limits of maximum pressure (about 13,500

FIG. 36
Sight E-4

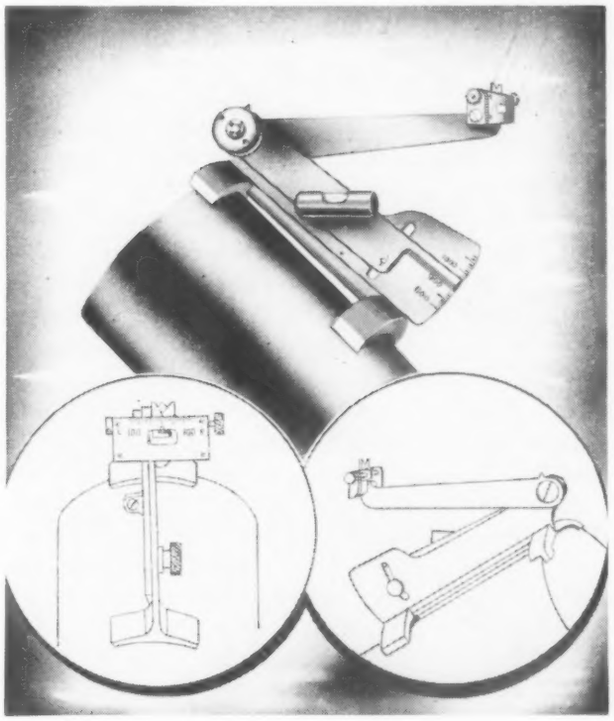


FIG. 37
Sight M-II

pounds per square inch). Changes in the ignition cartridge or the propellant were entirely feasible; while redesign of the mortar to withstand higher pressures was not only impractical within the limited time available, but was undesirable since it was thought to involve increases in the weight of components.

The mechanism of shell propulsion is quite simple. When the cartridge ignites, the resulting flame passes through holes in the tubular cartridge container and envelops and ignites the propellant powder increments attached thereto. If the flame is too hot, or if it acts with explosive violence, it causes excessive shattering of the powder disks. The result is an immediate increase of exposed surface of the powder, a corresponding sharp rise in the pressure, and a nullification of the slow burning effect necessary for the most efficient propulsion. In order to determine just how much fragmentation was occurring, charges were fired assembled on a suitably supported shell while immersed in water in a drum. Extensive shreddings of the powder occurred in all tests. There were several ways of reducing this shredding. One was to close all the holes in the cartridge container except those at the rear and thus force the flame from the cartridge to approach the powder from the rear end. When tried, the normal ignition charge of 120 grains of Infallible powder blew out most of the threaded plugs which had been used to stop the holes. A cartridge with a 60-grain ignition charge was then tried with much better results. Firings of the mortar with this cartridge resulted in 50 percent reduction in pressure and approximately only 10 percent range reduction.

This was encouraging but was not yet the answer. The experiments were extended to include the use of radial strips of powder wrapped around the cartridge container like tape; tests were made with alternate disks of powder with standard and thicker web with cardboard disks between; black powder and Red Dot 12 were used in the ignition cartridge in place of Infallible; changes in the chamber volume below the shell were made by reducing or increasing the length of the firing pin. Increase of the chamber volume produced the most spectacular result in increased range within the required pressure; but unfortunately it also increased the minimum range far beyond the required limit of 500 yards. An externally adjustable firing pin length would have been necessary to meet both conditions. Attempts had once been made in the early stage of the mortar development to design such a device; but without success. A similar difficulty arose with the 60-grain ignition cartridge; the maximum

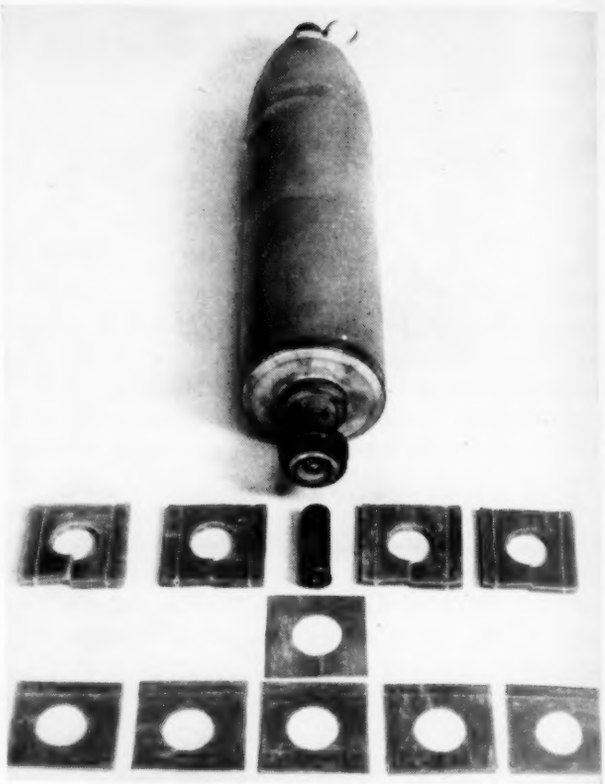


FIG. 39
Propellant Increments

range could not be increased without increasing the minimum range.

Perhaps the answer to the problem was suggested by the scheme of using alternate disks of standard and double standard web with cardboard insertions. This scheme itself was unsuccessful but it provided a supply of disks with a web thickness of 0.025 inch. In September 1942 one round was fired with a charge of these thicker disks alone. The results were so satisfactory that confirming experiments were conducted with varying web thicknesses. With a given charge and several conditions of firing, it appeared that the range was an approximate linear function of the web thickness, and that the pressure decreased rapidly with the initial increase in web thickness and thereafter at a slower rate. A web thickness of about 0.025 inch was found to give the optimum pressure-range relationship. Ranges as low as 340 yards were obtained with this web and as high as 4,545 yards, the latter with a maximum pressure of only 12,650 pounds per square inch.

Such important results with such simple means are rare. All that was necessary was a doubled web thickness of the powder. The heavier web offered less surface area and slowed the rate of burning to such an extent that a large increase in the actual weight of powder was possible without the danger of excessive pressures in the

barrel. In fact, the available cartridge containers were not long enough to hold the maximum charge of powder. The disk was consequently increased in size to 2¾ inches square. The standard maximum charge became 25½ increments and was standardized as M6 in March 1943. For convenience in field adjustment of the charge, the powder was shipped in 1-increment, 5-increment, and ½-increment packs.

In addition to the increased range obtained with the 0.025-inch powder, the following effects became apparent: no disturbance of the exterior ballistics; satisfactory functioning of the propellant at temperatures ranging from 0 to 130 degrees F. with reduced charges used at sub-zero temperatures; a substantially smaller and shorter-lived muzzle flash; movements of the baseplate were not increased excessively with the maximum charge of the 0.025-inch web over those experienced with the 12-increment charges of the powder having 0.013-inch web. The desired results were therefore obtained by means adapted to immediate field application.

Final Assembly M2

The 4.2-inch Chemical Mortar was standardized as M2 in October 1943 (Fig. 40). The principal components of the mortar underwent little visible change in the transition from the MIA1 to the M2 assembly. The barrel, as noted above, was provided with a removable tube cap which facilitated the rifling and thus greatly reduced the production cost. Some metal was added at the tube-cap end for increased strength, and steels of 110,000 pounds per square inch yield point were used, resulting in a so-called "improved" barrel M2. A life-span test conducted by the Chemical Warfare Board resulted in no deformation of the tube and satisfactory ballistic performance after 2,500 rounds of full-charge fire. During the unexpectedly severe usage of the barrel in Italy during the war, however, some breakage of the spring relief features of the shock absorber was reported.

The new baseplate M2A1 differed from the preceding model mainly by the addition of a titanium steel cup (receiving the barrel base cap), two reinforcing ribs, new welding and heat treatment specifications, and some additional improvements in the design of the cup and spades.

The MI standard was provided with a double lead thread in the elevating screw to double the rate of elevation; a ball-thrust bearing between the top of the spring and the bottom of the shoulder on the elevating-screw, in order to prevent "winding" of the spring when changing elevation; and higher grade alloy steel for the traversing slide. The spring inserted in the standard to permit downward recoil of the barrel has already been mentioned.

Both the MIA1 and M2 mortars were used extensively in World War II, being especially serviceable on the declivities and ledges of mountainous terrain inaccessible to artillery. The results tended to more than confirm the predictions of Capt. McBride made as early as 1925, that "One 4.2-inch Chemical Mortar, accompanying the infantry, can in the same time, deliver over six times as much high explosive, smoke, or gas as the 155-mm. gun or howitzer, and over nine times as much as the 75-mm. gun, up to a range of 2,500 yards in front of the infantry." The very popularity of the weapon took its toll in worn and damaged parts, much of the damage being due no doubt to attempts to get more service out of the mortar than it was designed to deliver. Not only were broken springs on the barrel reported, but also cracked baseplates and spades, broken connectors, and bent elevating screws on the standards. Work was started immediately, with the receipt of reports from the theaters, on the development of a new mortar to correct the reported deficiencies. Two parallel developments were carried on, and one, the E35 mortar, was brought to completion and thoroughly tested. The other, an improved mortar of radical design, which was mentioned in the first article, proved so much more promising in every respect that the E35 development was abandoned. Certain features of the E35 mortar, specifically a one-piece tube cap and replaceable connectors, were incorporated as changes in the M2 mortar.

General Data

The fire power of the M2 mortar is reflected in the standard rate of fire, which is 20 rounds

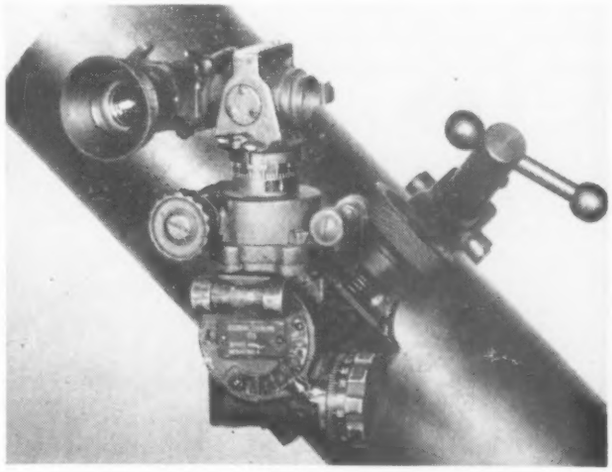


FIG. 38
Sight M-59

per minute for 2 minutes rapid fire, and 5 rounds per minute for sustained fire. The maximum elevation of the barrel is 1065 mils (there are about 17.8 mils in one degree) ; the extreme right or left traverse without re-emplacement is 125 mils.

The mobility of the mortar is illustrated by the

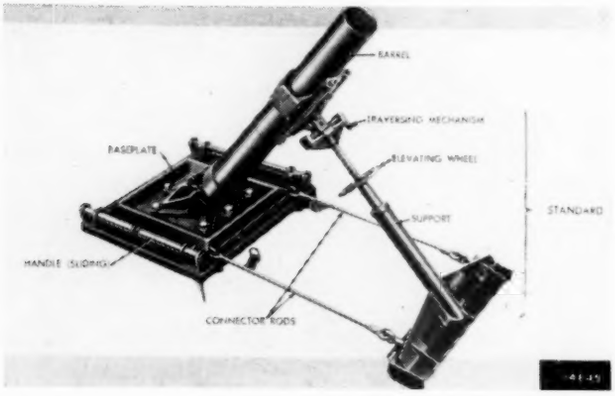


FIG. 40
4.2-inch Chemical Mortar M-2

rapidity with which it may be emplaced or dismounted, and by the weight of the components, any one of which is readily handled by two men. The heaviest component, the baseplate, weighs 175 pounds, the barrel weighs 105 pounds, the standard 53 pounds. The entire mortar with accessories and ammunition is transportable by two to five men, depending on the terrain, in the standard MIA1 rubber-tired mortar cart. The entire load, including mortar, cart, and twelve rounds of ammunition weighs 557 pounds.

Scientist and Reserve Officers

(Based on Dept. of the Army Circular 127)

The Department of the Army has established a program of particular interest to chemists, chemical engineers, and other scientists who hold Reserve commissions in the Army, and who are professionally engaged in teaching or research and development.

The objectives of the program are to:

(1) maintain the useful affiliation of chemists and other scientists with the Organized Reserve Corps,

(2) provide peacetime Reserve assignments for these officers, enabling optimum utilization of their education, experience and skills,

(3) furnish mobilization assignments which will fully utilize their talents, and

(4) adequately prepare these officers for mobilization.

The Technical Services of the Department of the Army submit to these Research and Development Reserve Groups research problems and projects which pose an intellectual challenge to members of the group. Thus, the program provides members of each group a type of training which is in keeping with their scientific and technical interests and competence, rather than a traditional kind of training session in which scientists have little or no interest.

The program is now being implemented only in those areas where there is a definite local interest. To date, eighteen Research and Development Reserve groups have been organized. Twelve additional groups are in process of organization. Others are in the initial stages of formation. Several of these groups have been formed in communities in which large universities, industrial research laboratories, or private research foundations are located. Typical localities are Chicago, Illinois; Wilmington, Delaware; Newark, New Jersey; Houston, Texas; Washington, D. C.; Manhattan and Lawrence, Kansas; Champaign-Urbana, Illinois; Pittsburgh, Pennsylvania; Denver, Colorado; and Detroit, Michigan.

Provision is made to submit research projects of interest to all categories of scientists—chemists, physicists, engineers, geologists, geographers, psychologists, mathematicians, and all of the biological scientists.

Reserve officers who are currently engaged in civilian research, college or university teaching, or industrial research or development, or who in the past have had specific research experience are eligible to make application for assignment to an Organized Reserve Research and Development Group. A group may be organized in any locality where there are twenty (20) or more qualified officer scientists who desire to participate in the program. A subgroup may be organized with ten (10) qualified members.

The program is under the general direction of the Research and Development Group, Logistics Division, General Staff, United States Army. The entire program is outlined in Department of the Army Circular Number 127, dated 5 May 1948.

Inquiry about organization of an Organized Reserve Research and Development Group or about assignment to a group already organized should be made of the Unit Instructor, ORC, or of the Senior Army Instructor, ORC, in the locality in which the officer resides. In localities in which a group has already been organized, the Commanding Officer of the group will consider applications for assignment of additional officers.

Book Reviews

ORGANIC REACTION. Vol. IV. Roger Adams (Editor-in-Chief), Werner E. Bachmann, A. H. Blatt, Louis F. Fieser, John R. Johnson, and Harold R. Snyder. viii+428 pages. John Wiley & Sons, Inc., New York, N. Y., 1948. $6.

The series, of which this volume is the fourth, was begun in 1942 and has for its object the compilation of all the important synthetic chemical reactions. Each chapter in the series is written by one or more specialists in the particular reaction described, and comprises a general discussion of method, modifications, examples of applications, special precautions, a detailed description of procedure, expected yields, etc. Compounds which have been prepared with the aid of the reactions are tabulated, and a complete bibliography of all important references is included with each chapter.

The present volume contains eight chapters as follows: The Diels-Alder Reaction with Maleic Anhydride, by Milton C. Kloetzel; The Diels-Alder Reaction: Ethylenic and Acetylenic Dienophiles, by H. L. Holmes; The Preparation of Amines by Reductive Alkylation, by William S. Emerson; The Acyloins, by S. M. McElvain; The Synthesis of Benzoins, by Walter S. Ide and Johannes S. Buck; Synthesis of Benzoquinones by Oxidation, by James Cason; The Rosenmund Reduction of Acid Chlorides to Aldehydes, by Erich Mosettig; and the Wolff-Kishner Reduction, by David Todd.

The total number of references cited in the book exceeds 1800 and, in addition to the hundreds of compounds given in the tables, there is an index of compounds referred to in the text. The comprehensive coverage of each reaction practically does away with the need of a literature search by investigators who wish to conduct further studies on these reactions.

The book is a valuable addition to our literature and should be in every organic chemist's library.

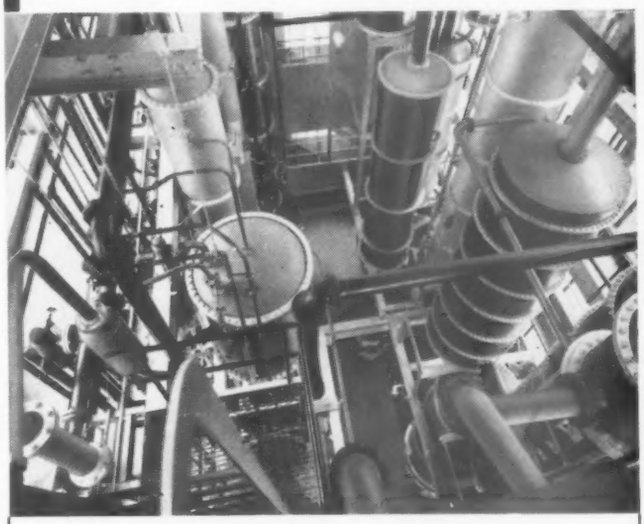
L. WILSON GREENE.

OUTLINES OF PHYSICAL CHEMISTRY. Farrington Daniels. viii+713 pages. John Wiley & Sons, Inc., New York, N. Y., 1948. $5.

The classic text, "Outlines of Theoretical Chemistry," was originally prepared in 1913 by Dr. Frederick H. Getman and went through four

the VULCAN organization

has served the Process Industries for forty-seven years, and throughout this period has been engaged exclusively in the highly specialized fields of Distillation, Evaporation and Extraction. Below is a representative list of chemicals now being processed in Vulcan-designed plants and equipment:



ALCOHOLS
Methanol — synthetic
Methanol — from wood distillation
Ethanol — industrial grades from molasses and grain
Ethanol — from sulphite waste liquor
Ethanol — anhydrous, Vulcan process
Ethyl alcohol — beverage, neutral spirits, beer
Isopropanol
Allyl alcohol
Butanol

ESTERS
Methyl acetate
Ethyl acetate
Isopropyl acetate
Butyl acetate
Vinyl acetate
Dibutyl phthalate
Methyl methacrylate

ALDEHYDES
Acetaldehyde
Butyraldehyde
Furfural

ETHERS
Ethyl ether
Isopropyl ether

DDT

KETONES
Acetone
Methyl ethyl ketone

GLYCOLS
Ethylene glycol
Butylene glycol

CHLORINATED HYDROCARBONS
Chloroethane
Chlorobenzenes
Chlorotoluenes
Trichlorethylene

HYDROCARBONS
Butadiene
Heptane
Benzene
Toluene
Styrene
Diphenyl
Hexane
Alkyl Benzenes

ACIDS
Formic acid
Acetic acid — from wood distillation
Acetic acid— from process residues and solvent recovery
Acetic anhydride
Propionic acid
Butyric acid
Stearic acid
Monochloracetic acid
Salicylic acid
Fatty acids

PHENOLS
Phenol
Naphthol

MISCELLANEOUS
Citronellal
Geraniol
Essential oils
Aniline
Monethylaniline
Diethylaniline
Oxygen
Hydrogen
Arsenic trichloride
Waste sulphite liquor

Vulcan distillation evaporation extraction processes and equipment

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• SHOP FABRICATION • FIELD ERECTION • INITIAL OPERATION

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SAN FRANCISCO NEW YORK BUENOS AIRES
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editions. In 1930 Dr. Daniels took over the responsibility for writing the book and the well-known work, generally referred to as "Getman and Daniels," was published in three more editions. Since so many revisions have been made, nothing of Dr. Getman's original work remains, so the publishers decided that the present revision should be issued solely under Dr. Daniels' name. Actually it should be considered as a new book, rather than as a new edition of a standard text.

The following changes will be found in the new work: Data from laboratory measurements have replaced hypothetical diagrams formerly used to illustrate physical chemical phenomena; new problems, designed to stimulate thought rather than to illustrate formulas, have been substituted for many of the old problems; the text has been brought up-to-date to include new developments in physical chemistry; the chapters have been rearranged and numerous descriptions have been clarified; and some of the more elementary discussions of the subject have been omitted. Another important revision concerns the removal to the appendix of the more specialized or advanced phases of the subject, such as the Debye-Huckel theory, methods for calculating the activities of electrolytes, the statistical thermodynamical approach, and the derivation of several mathematical formulas.

While the book is intended primarily for use as a text for college and university students, it is a valuable source of information for all who are interested in acquiring a knowledge of physical chemistry.

L. WILSON GREENE.

SAMPLING INSPECTION. PRINCIPLES, PROCEDURES, AND TABLES FOR SINGLE, DOUBLE, AND SEQUENTIAL SAMPLING IN ACCEPTANCE INSPECTION AND QUALITY CONTROL BASED ON PERCENT DEFECTIVE. The Statistical Research Group, Columbia University. Edited by H. A. Freeman, Milton Friedman, Frederick Mosteller, and W. Allen Wallis. xx+395 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1948. $5.25.

Prior to the development of mass production techniques, the quality of commercially fabricated items was controlled, for the most part, through pride in workmanship, since any manufactured article could readily be traced to the individual who made it. Furthermore, in those days of hand work and low man-hour rates, the addition of a few more inexpensive man-hours to each item for the purpose of 100 percent inspection was not an intolerable burden.

With the advent of mass production, pride in

workmanship disappeared. Man-hour costs rose tremendously and the expense of 100 percent inspection resulted in an intolerable percentage increase in over-all costs. Obviously, the only solution to this cost problem lay in a system of sampling whereby only a portion of the finished items would be inspected.

Prior to World War II most sampling plans used by commercial and governmental purchasing agencies were highly arbitrary and at best gave only general indications as to the quality of the material sampled. In many instances it was later shown that numerous lots of material rejected were superior to certain other lots which had been accepted on the same sampling plan.

With the advent of World War II, the many governmental agencies became aware of the deficiencies of their sampling systems and sought some uniform type of scientific sampling procedure based on the investigations previously carried on at the Bell Telephone Laboratories. To implement this search a Statistical Research Group of the NDRC was appointed, consisting, in part, of the editors of this volume.

Numerous papers have been published in various periodicals and several books on statistical sampling have been printed but, in general, they have been so highly technical as to limit their readership to those already familiar with the field; or have been so simplified as to make them of little aid in setting up a specific sampling inspection system in a given set of circumstances. "Sampling Inspection" fills this gap insofar as sampling by attributes is concerned. The book consists of five relatively independent parts, each of which is so written as to practically eliminate cross-referencing. Part I explains the purpose and scope of the book and points out the possibilities and types of scientific sampling inspection. Part II exhaustively covers the subject of "Principles of Sampling Inspection for Attributes," including a complete description of single, double and sequential sampling plans. Part III gives an over-all picture of "A Standard-Sampling Inspection Procedure." Part IV describes the "Construction of Sampling Tables and Standard Procedure"; and Part V is composed of well over a hundred tables and operating-characteristic curves covering a wide range of AQLs. This book is undoubtedly the best existing text for an engineer, inexperienced in the field of statistical quality control and sampling, who wishes to grasp the essentials and install such an inspection sampling system in his plant or incorporate it in his organization's procurement documents. As is essential for a book of this type, it is exhaustively indexed with all chapters, paragraphs, subparagraphs, figures and tables being numbered, titled where relevant, and cross-referenced, both in the 7-page list of contents and the 9-page index. A list of figures, a list of tables and a glossary which gives complete and exceedingly clear definitions of all terms peculiar to this field are also included.

The book is well set up with a very legible type and well-prepared charts and tables. Four-color printing has been utilized in the case of all operating-characteristic curves to facilitate their ready interpretation. Apparently no effort has been spared in preparing the volume that will undoubtedly become the standard reference in its limited but highly important field.

FRED B. SHAW, JR.

RECLAMATION OF CONSTITUENTS OF SURPLUS AND REJECTED HC SMOKE MIX

The feasibility of recovering the constituents of surplus HC smoke pots and of rejected lots of HC smoke mix was investigated by the Chemical Corps and suitable processes were worked out for their reclamation. HC smoke mix is composed of hexachloroethane, zinc oxide, and aluminum.

Solvent extraction, sublimation, and steam distillation were investigated as possible methods for recovering the hexachloroethane. Steam distillation proved to be the best of these methods and was carried out in conventional steam distillation equipment, except that the vapors were condensed by leading them through a wide tube into a jar of ice cooled water. A small percentage of sulfuric acid was added to the still-pot to prevent foaming. Steam consumption was 2 lb. steam per pound of hexachloroethane recovered. Analysis of the product before drying showed 0.013% acidity and acid forming substances, 83.0% chlorine, and 8 to 9% water. On a dry basis this amply met the requirements of purity.

The residue in the still, after removal of the hexachloroethane, was studied for separation of the zinc oxide and the aluminum by physical methods, by acid treatment, and by alkaline treatment. The most satisfactory process consisted in dissolving the aluminum in a mixture of sodium carbonate and sodium hydroxide and treating the soluble portion with carbon dioxide to recover the aluminum as aluminum oxide, with zinc oxide as the insoluble residue. Recovery of aluminum oxide and zinc oxide was almost theoretical.

Methods for recovery of the constituents of HC smoke mix were developed by A. M. Reeves, Chemical Division, Technical Command, Army Chemical Center, Maryland.

New Publications Of Interest to Association Members

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Dr. Noyes

(Continued from page 8)

Since the end of the war, Dr. Noyes has given constantly and liberally of his time and vast knowledge to problems and projects vital to the Chemical Corps.

Dr. Noyes served as President of the American Chemical Society in 1947, and his other numerous professional associations have included the National Academy of Science, the American Association for the Advancement of Sciences, the Chemical Society (London), the American Physical Society, the American Academy of Sciences, the Illinois Academy of Sciences, the New York Academy of Sciences, and the Societie de Chim. physique.

Personnel Policies

(Continued from page 15)

utilized to the fullest practicable degree and reassignments made as necessary.

Training Assignments

Army Area Commanders will organize such Organized Reserve Corps Training Units within the authorized training unit troop basis as may be necessary to enable officers to be trained according to their military occupational specialties and fields of specialization, and will assign officers thereto as conditions warrant.

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Effects of Heat and Air on Powdered Metallic Magnesium and Barium Chromate Mixtures

By EDGAR A. GREEN and ROGER A. REYNOLDS
Chemical Corps Technical Command
Army Chemical Center, Maryland

SYNOPSIS

In a statistical study by another group at Army Chemical Center concerning the sensitivity of pyrotechnic mixtures of 75 percent barium chromate and 25 percent powdered metallic magnesium, a relationship was shown between relative humidity at the time of preparation and pyrotechnic functioning of the mixture. In the present work it was found that when this composition is exposed to heat and air at high relative humidity the powdered magnesium metal acquires a coating of magnesium hydroxide, which later becomes the carbonate, sulfate, or oxide. No acid or acid-forming substances or water-soluble salts were found as a result of chemical interaction between the barium chromate and metallic magnesium.

In an investigation to determine the best materials to be used in a pyrotechnic mixture, various combinations of magnesium, zirconium, aluminum, titanium, silicon, manganese, magnesium-aluminum alloy, and titanium-manganese with sulfur, red lead, lead chromate, cupric oxide, barium chromate, manganese dioxide, and iron oxide were tested. The best combination of materials was found to be barium chromate and powdered metallic magnesium in a ratio of 3-1, respectively (5). However, after long periods of storage it was found that this mixture became less sensitive to ignition.

In a statistical study by Mandelson (6) it was reported that a relationship existed between sensitivity and the season of the year in which the mixture was manufactured. In the above report the author expressed the belief that variations in pyrotechnic quality were due to the effects of variations in relative humidity (below 55 percent) on hygroscopic impurities in the raw materials used (6).

The possibility that chemical interaction between the barium chromate and the magnesium was responsible for the deterioration of this pyrotechnic mixture was considered in discussions with Mandelson. It was also considered possible that barium chromate of low pH (containing barium dichromate) reduces the calorific value of the mixture by combining with the magnesium. Mandelson suggested that the stability of 3:1 barium chromate and magnesium mixtures be investigated (3).

The work carried out in this investigation is concerned mainly with the effects produced in the mixture by exposure to varying atmospheric conditions.

Experimental Procedure

Five samples of barium chromate and one of powdered metallic magnesium, which had been analyzed by specification procedures, were used in this work. The analyses of these materials are given in Tables 1 and 2 as follows:

Table 1. ANALYSIS OF POWDERED METALLIC MAGNESIUM, GRADE B, ACCORDING TO U. S. ARMY SPECIFICATION NO. 57-21-1C, 19 AUGUST 1944, AMENDMENT NO. 1, 28 MARCH 1945

Determination	Specification Requirements %	Magnesium, Grade B, PBA %
Metallic iron	0.05 Max.	Less than 0.05
Insoluble residue	0.25 Max.	Less than 0.05
Silicon	0.10 Max.	0.07
Alloyed iron and aluminum, calc. as oxides	0.40 Max.	Less than 0.01
Grease and oil	0.02 Max.	Less than 0.01
Magnesium metal	92.0 Min.	92.61
Carbides	None	None
Odor	None	None

Table 2. ANALYSIS OF BARIUM CHROMATE ACCORDING TO C.W.S. SPECIFICATION NO. 196-131-179, AMENDMENT NO. 1, OCTOBER 1943; AMENDMENT NO. 2, 22 APRIL 1944

Determination	SAMPLE NO. 1 %	2 %	3 %	4 %	5 %	Specification Requirement %
Chromium content of water-insoluble material, calc. as $BaCrO_4$ on sample basis	99.01	99.04	98.88	98.88	98.94	97.0 Min.
Barium content of water-insoluble material, calc. as $BaCrO_4$ on sample basis	98.07	98.20	98.27	98.19	97.80	99.0 Min.
Chlorides, calc. as Cl.	0.05	0.01	0.02	0.02	0.02	0.25 Max.
Water-soluble material	0.14	0.19	0.06	0.27	0.23	0.25 Max.
Loss in weight at 105° C.	0.06	0.11	0.10	0.11	0.08	0.20 Max.
Particle size (thru U. S. Standard sieve No. 200)	99+	99+	99+	99+	99+	95.0 Min.
Reabsorption of moisture (gain in weight in 24 hours at 80% R.H.)	0.04	0.03	0.03	0.02	0.01	0.4 Max.

Using each of the five barium chromate samples separately, laboratory mixtures were made containing 75 percent barium chromate and 25 percent powdered magnesium. Four to 5 g. of each of these mixtures was weighed accurately into

ground-glass-stoppered moisture dishes, 4 cm. in height and 6 cm. in diameter. The uncombined materials were similarly weighed into moisture dishes, and all were subjected to the following conditions for 30 days:

1. In open dishes enclosed in an efficient desiccator containing "Drierite" (anhydrous calcium sulfate).

2. In closed dishes allowed to stand in the atmosphere during a period of less than 80 percent relative humidity.

3. In open dishes enclosed in a container over 27 percent sulfuric acid, maintaining 80 percent relative humidity.

4. In open dishes allowed to stand in the atmosphere during a period of greater than 90 percent relative humidity.

5. In addition, a sample of the powdered metallic magnesium used was exposed in an open dish, over water, in a container, at 65° C. for eight days.

At the end of the 30-day period the samples and mixtures were weighed, and the gain in weight was noted. This change in weight represents either simple moisture absorption or a change in the chemical composition of the materials. After the gain in weight was noted each of the samples and mixtures was extracted with 100 ml. of hot distilled water, and the following determinations were made on each extract: pH, the amount of water-soluble matter, and the presence of barium, chromium, magnesium, or sulfate.

The above results were compared with results on the magnesium and barium chromate samples and mixtures of these which had not been exposed to varying conditions of heat, air, and humidity.

The pH of the water-soluble extracts was obtained using a Beckman pH meter, Laboratory Model G. Standard qualitative procedures given by Scott (7) were used in testing for the chemical elements.

Discussion of Data

It was found that the percent of water-soluble material in the original materials (Table 2) and mixtures of these (Table 3) after exposure to air at from 80-95 percent relative humidity was approximately the same as that of mixtures kept in closed dishes, those exposed to 80 percent relative humidity, and those kept in an efficient desiccator. However, the gain in weight of the mixtures after exposure to air at a relative humidity of 80 percent or above was much greater than mixtures kept in closed dishes or in an efficient desiccator. Although the amounts of water-soluble material found in all cases indicate that very little, if any, water-soluble salts are formed under the above conditions, the gain in weight of the mixtures and the small amount of moisture absorbed by the barium chromate (Table 6) does indicate that this gain is not due to absorbed moisture, but to a change in the magnesium from metallic magnesium to a magnesium salt.

Table 3. WATER-SOLUBLE MATERIAL AND GAIN IN WEIGHT OF LABORATORY MIXTURES AFTER EXPOSURE FOR 30 DAYS

Mixtures Using Different Barium Chromate Samples	Closed Dishes in Efficient Desiccator		Closed Dishes in Open, Less Than 80% R.H.		Unclosed Dishes in Container, 80% R.H.		Unclosed Dishes in Open, 80-95% R.H.	
	Water-Soluble Material	Gain in Weight	Water-Soluble Material	Gain in Weight	Water-Soluble Material	Gain in Weight	Water-Soluble Material	Gain in Weight
	%	%	%	%	%	%	%	%
Barium chromate 1	0.30	0.04	0.37	0.08	0.46	2.19	0.44	3.90
" " 2	0.15	0.06	0.15	0.08	0.31	1.93	0.19	2.44
" " 3	0.22	0.07	0.15	0.01	0.18	1.56	0.14	2.57
" " 4	0.21	0.06	0.13	0.09	0.23	1.76	0.21	2.86
" " 5	0.15	0.08	0.14	0.09	0.17	1.74	0.17	2.51

Haughton and Prytherch (4) have found that dry air at ordinary room temperatures has very little corrosive action on magnesium, but that the rate of attack increases slowly up to about 90 percent relative humidity. At 90 percent or above a very rapid increase occurs, magnesium hydroxide being first formed and slowly converted into hydrated carbonate. Some sulfate may also be formed, so that the corrosion product may be a mixture of hydroxide, oxide, carbonate, and sulfate. The hydroxide layer which is first formed is porous, but as the secondary reactions take place to form the carbonate and sulfate the pores are closed and the film of corrosion finally becomes protective. In the corrosion of magnesium the type of reaction is hydrogen gas displacement, the oxygen type of attack being completely absent. Also in an investigation of the corrosion of magnesium Yamaguti (8) found that the corrosion of magnesium in the atmosphere is due to the water contained in the atmosphere.

The amount of magnesium found (Table 4) in the water extracts of the mixtures left in the open with tops removed during the 30-day period, at a relative humidity up to about 90-95 percent was estimated to be considerably higher than mixtures which remained at 80 percent relative humidity and very much higher than those kept closed or in an efficient desiccator.

Table 4. WATER-SOLUBLE MAGNESIUM IN LABORATORY MIXTURES AFTER EXPOSURE FOR 30 DAYS

Mixtures Using Different Barium Chromate Samples	Closed Dishes in Efficient Desiccator	Closed Dishes in Open, Less Than 80% R.H.	Unclosed Dishes in Container, 80% R.H.	Unclosed Dishes in Open 80-95% R.H.
	%	%	%	%
Barium chromate 1	Trace	Trace	Less than 0.05	Greater than 1
" " 2	"	"	"	"
" " 3	"	"	"	"
" " 4	"	"	"	"
" " 5	"	"	"	"

According to Beck (1), chromium cannot be alloyed with magnesium; however, minute quantities of chromium present as a second phase reduces the corrosion resistance of magnesium appreciably. Thus, if a trace of chromium were present in the mixture of barium chromate and magnesium, the corrosion process would go on indefinitely, a large portion of the magnesium particle being converted to salts. In this event the coating which forms on magnesium is nonprotective.

Beck (2) has also stated that magnesium and its alloys, when exposed to atmospheric attack, show very good resistance to corrosion, better in fact than the resistance shown by a number of aluminum alloys or iron. The metal becomes coated with a gray oxide film which is eventually converted to carbonates and sulfates, the carbonates predominating. In this case a protective film is formed. As pertains to the sensitivity of magnesium powder used in a pyrotechnic mixture, any coating, whether protective or nonprotective, would render the metal less sensitive to ignition.

The pH of water extracts of mixtures was essentially the same in all cases (Table 5). Also, the pH of good-burning mixtures in current use was approximately the same as that of the laboratory mixes after exposure for 30 days at 80 percent relative humidity (Table 6). Barium chromate was found to be neutral or slightly basic, changing from a slightly acidic condition, after exposure for 30 days at 80 percent relative humidity (Table 6), while magnesium metal was found to be unchanged with approximately the original alkalinity, even after exposure to 100 percent relative humidity at 65° C. for eight days (Table 7).

Table 5. pH OF WATER EXTRACTS OF LABORATORY MIXTURES AFTER 30-DAY EXPOSURE

Mixtures Using Different Barium Chromate Samples		Closed Dishes in Efficient Desiccator	Closed Dishes in Open, Less Than 80% R.H.	Unclosed Dishes in Container, 80% R.H.	Unclosed Dishes in Open, 80-95% R.H.
Barium chromate	1	9.05	10.08	9.60	9.70
" "	2	10.05	10.00	9.80	10.00
" "	3	10.05	10.15	9.95	9.99
" "	4	10.12	10.10	9.92	10.02
" "	5	10.02	9.98	9.74	9.90

It was found that the purity of the magnesium metal, as analyzed by the hydrogen evolution method, dropped to less than half of its original purity when exposed to 100 percent relative humidity at 65° C. for eight days. However, the gain in weight of the metal, when exposed in this manner, was almost one-half its original weight. This exposed material lost only about 2 percent when dried to constant weight at 110° C. Thus, the gain in weight of the metal must be due to a change in its chemical composition and not to simple moisture absorption. Also the amount of water-soluble matter remained approximately the same as that of the original material (Table 7).

Because of the above data and work given previously in the literature, it is thought that magnesium metal, when exposed to heat and air at high humidity, becomes coated with a layer of magnesium hydroxide, carbonate, sulfate, oxide, or a mixture of these.

The amount of water-soluble material found in the barium chromate samples did not change appreciably under any conditions of the test and was similar to the amounts found in laboratory mixtures and good-burning samples (Table 6). Barium, chromium, or sulfate was not detected in these tests, thus indicating that very little, if any, chemical interaction took place between the barium chromate and the powdered magnesium which would result in the production of a water-soluble salt, such as magnesium chromate. Also, the result of pH determinations on component materials, laboratory mixtures, and plant mixtures did not disclose the formation of acid or acid-forming substances.

Table 6. BARIUM CHROMATE, LABORATORY MIXTURES AND GOOD-BURNING MIXTURES

Description of Sample		Gain in Weight 24 Hours at 80% R.H. %	Gain in Weight 30 Day at 80% R.H. %	Water-Soluble Material Original Sample Amount %	Water-Soluble Material Original Sample pH	Water-Soluble Material 30 Day at 80% R.H. Amount %	Water-Soluble Material 30 Day at 80% R.H. pH
Barium chromate	1	0.04	0.10	0.14	6.06	0.22	7.50
" "	2	0.03	0.06	0.19	6.34	0.11	7.69
" "	3	0.03	0.08	0.06	6.12	0.14	7.69
" "	4	0.11	0.07	0.27	6.45	0.11	7.69
" "	5	0.08	0.06	0.23	6.42	0.17	7.60
Good-burning mixture	1	.....	.....	0.14	9.56	.....	—
" "	2	.....	.....	0.23	9.55	.....	—
" "	3	.....	.....	0.25	9.85	.....	—
Laboratory mixture	1	.....	3.90	0.24	.....	0.46	9.60
" "	2	.....	2.44	0.29	.....	0.31	9.80
" "	3	.....	2.57	0.16	.....	0.18	9.95
" "	4	.....	2.86	0.37	.....	0.23	9.92
" "	5	.....	2.51	0.33	.....	0.17	9.74

Table 7. POWDERED METALLIC MAGNESIUM, GRADE B

Condition of Test	Metallic Magnesium %	Gain in Weight %	Water-Soluble Material %	Water Extract pH	Loss in Weight at 110° C. After Exposure %
Original material	92.61	.....	0.09	10.27	—
30 days in open, tops removed, at room temp., and 90% or above R.H.	.....	4.36	0.17	10.00	—
30 days in open, tops removed, at room temp., and 80% R.H.	.....	0.03	0.23	9.88	—
30 days in efficient desiccator, tops closed at room temp.	.....	No change	0.16	9.80	—
8 days at 65° C., 100% R.H.	41.13	48.30	0.15	9.99	1.95

Effects of Heat and Air

Conclusions

1. Under the influence of heat, air, and moisture, powdered magnesium metal acquires a coating of magnesium hydroxide, later becoming the carbonate and sulfate, making this metal less sensitive to ignition in a pyrotechnic mixture. Also, the purity of powdered magnesium metal, as analyzed by the hydrogen evolution method, is lowered greatly when subjected to heat and humidity.

2. Mixtures of barium chromate and magnesium tested show very little water-soluble salts resulting from chemical interaction between the two.

3. No acid or acid-forming substances as revealed by pH values were found in these tests.

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The San Jose Project Moves

By CAPT. JAY S. STOCKHARDT, *CmlC*, and 1ST LT. STEPHEN D. NOYES, *CmlC*

The San Jose Project which had been located for four years on the Island of San Jose in the Perlas Group in the Bay of Panama received last year a rather unwelcome Christmas gift. With almost no warning it was told to move, and to move in a hurry. About midnight 23 December 1947 the project was informed that it would have to get out at once with no new home to move into.

To appreciate what this meant the following facts will have to be considered. The project was located on an isolated tropical island otherwise uninhabited. There were two complete communities. One, the Post proper, had every facility normally associated with a small Army Post. The other, the Engineer camp, might be looked upon as an industrial establishment with complete housing and recreational facilities for its workers. These two establishments were entirely self-contained. They had to supply all their own utilities such as electricity, water, communications, etc. In addition to these communities there was an enormous amount of materiel peculiar to a Chemical Corps Proving Ground. There existed laboratories with specialized laboratory equipment, warehouses full of technical supplies, toxic yards containing thousands of tons of chemical agents, explosives and Chemical Corps materiel. All of this had to be moved. The Army authorities in Panama allowed the evacuation to be handled on an emergency basis and set a deadline of 31 January 1948 for the evacuation to be completed.

The evacuation was completed and the island returned to the Panamanian Government on the 28th of January 1948.

Beating the deadline date was not accomplished by working union hours. The 20 officers, 150 enlisted men, and an equal number of civilians at San Jose Project worked practically around the clock every day during the month of evacuation. It should be appreciated that every pound of material had to be moved across the beaches

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against the vicissitude of a 20-foot tide and the meanest weather period of the year. No freight docks were available and no materiel handling equipment existed. There were not at San Jose, as there might have been on a larger installation, specialists from the Transportation Corps, Quartermaster Corps, Engineer Corps, etc., who would have been familiar with the problems of packaging and moving of large amounts of materiel. The Chemical Corps officers and men had to do it all. The variety of the problems will be appreciated when it is realized that the goods to be moved ranged from baby high-chairs to diesel electric generators. Everything was moved by hauling it to the beach, there packaging and crating it as required, loading it onto 500-ton ocean-going barges and towing these barges over 60 miles of the Pacific to the Canal Zone. A total of 31 of these barges were used. The problem was complicated on the receiving end by the fact that there was no new home for San Jose to move into.

Headquarters and Headquarters Detachment of San Jose Project was given two barracks at Fort Clayton, Canal Zone, and the families were scattered from the Atlantic to the Pacific side of the Zone wherever accommodations were found for them.

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The materiel owned by San Jose was stored wherever space could be found. Some of it was placed in the basements of barracks, more in an abandoned motor pool, and a toxic yard was established at the mouth of the Chagres River on the Fort Sherman Reservation.

This move was all made necessary by the failure of the Panamanian Government to ratify an agreement authorizing renewal of defense site bases in the Republic of Panama. When the Panamanian Government refused to ratify the agreement extending our leases for five years, the decision was made to abandon immediately. San Jose's particular problem was to move out, establish itself temporarily in the Canal Zone and find a new home. All three of these aims were accomplished simultaneously within the month following the "eviction notice."

Without belaboring the point that the job of evacuation was tremendous, the following excerpt from the San Jose Diary for the 13th of January 1948 is quoted:

"13 Jan 48—Barge #1897, towed by Tug ST872, returned after accomplishing mission of dumping munitions at sea. Barge returned this project 0500 hours.

"Barge #1898, towed by Tug ST872, departed San Jose Project 0600 hours. Barge loaded with miscellaneous equipment.

"Boat departed San Jose Project with passengers and cargo 1800 hours.

"Eight enlisted men from Post Transportation departed SJP to take up duties at Fort Clayton.

"C-45 plane arrived SJP 1455 hours.

"Major Ball and Captain Eder returned from mainland after moving dependents to new quarters.

"C-45 plane departed SJP 1505 hours.

"Captain Duty on reconnaissance nww Hq., Fort Clayton, C. Z., for this project, accompanied by S/Sgt. Meyers, Personnel Clerk.

"Barge #1885, towed by Tug ST844, departed SJP 1700 hours. Barge loaded with Ordnance vehicles consigned to Post Motor Pool, Fort Clayton, to be held for SJP.

"Pigeon loft burned at 2000 hours by order of USARCARIB.

"Engineer camp closed, and movement to main camp area was accomplished.

"If movement of equipment progresses as scheduled, closing date of this project will be advanced to an earlier date than that set by USARCARIB."

During the time that San Jose Project was located in the Canal Zone, troops participated in

all training schedules of the Pacific Sector, Canal Zone, and, in addition, prepared the materiel brought in from the Island for reshipment. The toxic munitions were all given complete maintenance and kept under 24-hour-a-day guard. This guard, incidentally, soon gained itself a reputation as the most efficient and toughest guard in the entire Zone.

The search for a new home for San Jose was extensive. Every available site in the Caribbean area was scouted. Some of the sites considered were Swan Island, Portland Bight in Jamaica, Navassa Island west of Haiti, Mona Island between the Dominican Republic and Puerto Rico, Culebra and Vieques lying between Puerto Rico and St. Thomas, V. I. and St. Thomas, Virgin Islands itself. It was decided that the most advantageous location was on St. Thomas, where an abandoned Naval Submarine Base was available and a large amount of land could be obtained. Formal possession of these facilities in the Virgin Islands was obtained on 7 April 1948. The San Jose Project personnel then had a multifold job. An advance party had to be sent to the Virgin Islands to prepare the way for the main body. All equipment had to be moved from the various locations, where it was stored, to the dock where it would be picked up by the Army freighter. San Jose moved all its own equipment to the ship's side. The ship that moved the project was rated at 6,500 tons. When it left the dock every bit of its capacity was used. The decks were piled high with equipment too bulky to go below decks. The explosives and toxics were moved separately on ocean-going barges towed by tugs. Just to add complications, one of the barges sprang a leak during heavy weather and nearly sank.

All personnel, including dependents and civilian employees, were air-lifted from Panama to the Virgin Islands by way of Jamaica and Puerto Rico. Approximately 170 military, 17 women and 19 children were moved without incident. Personnel filtered into the new station in groups ranging in size from 2 to 40 people. Thanks to herculean labors on the part of the advance party, accommodations were ready for everyone. At first, all dependents lived in the BOQ, giving it somewhat the air of a DP cantonment. Before too long, family quarters were made ready and the BOQ took on its normal function.

Upon the arrival of the freighter and the barges, the work of reestablishing San Jose commenced in earnest, and continues today. While all normal accommodations of an Army Post existed at St. Thomas and land was available for test purposes, none of the specialized facilities required by the project existed. Construction of these facilities has been requested and when completed San Jose Project will have proving ground facilities of which the Chemical Corps may well be proud. In the meantime, testing work is going on on a limited basis by the use of temporary expedients. A small chemical laboratory has been fitted out in one corner of a former torpedo storage room; a decon station has been set up in an old mess hall; a photographic laboratory is functioning in a former refrigeration room. Other makeshifts are in use so that some work can be carried on. Facilities now under control of San Jose Project consist of the land and buildings of a former Submarine Base, the quarters and beach of a former U. S. Marine Air Base, the whole of Water Island (a former Army cantonment), and some 2100 acres of land on the westernmost tip of St. Thomas.

The climate is very similar to that in Panama except that there is not as much rainfall. The temperature is as hot or hotter than it was on the Island of San Jose and the humidity is about the same range. The vegetation varies from that typical of semi-arid tropical climate to typical tropical growth. There is no high canopy jungle but scrub jungle abounds. There are areas in which practically any tropical or semi-tropical condition can be met.

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Letters to the Editor

The Air University
AIR COMMAND AND STAFF SCHOOL
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9 December 1948

The Armed Forces Chemical Association
Washington 1, D. C.
Attn: Mr. Harold B. Rodier, Editor

Dear Mr. Rodier:

I recently finished reading the Association's book "The Chemical Warfare Service in World War II," and would like to state as a general reaction that the book should be required reading for all Chemical Corps officers. I found it extremely interesting and informative.

In the interest of accuracy, I would invite your attention to one or two apparent errors which I noted in the book.

a. On page 147 near the bottom of the second paragraph, it is implied that the 37th Division participated in the seizure of Balete Pass. With all due respect to the 37th Division, which had a most admirable war record, they did not participate in the Balete Pass action, which was the mission of the 25th Division. The 25th Division was supported by "C" Company of the 98th Chemical Mortar Battalion during this entire action.

b. The account of the flame thrower action in New Georgia, discussed on pages 187 and 188, is questionable. This account was originally published, I believe, in the *Chemical Warfare Service Quarterly*—1944, under the authorship of Captain Olds, who presented it as a personal experience while he was assigned as Assistant Chemical officer of the XIV Corps during the New Georgia campaign. I first read the account while I was in New Caledonia, and took advantage of accessibility to Headquarters, Southwest Pacific Theater, to check up on this story as well as I could. I offer the following comments concerning this action:

(1) I was on New Georgia, in the vicinity of Munda Airdrome, about the time the alleged action occurred, and was in close contact with the Corps Chemical officer. I did not learn of this exploit until reading it in the *Chemical Warfare Quarterly.*

(2) The 43rd Division Combat Report which I examined in New Caledonia, makes no mention of this exploit but does state that the resistance encountered by the 103rd Infantry Regiment was overcome by Marine Corps tanks, assisted by flame thrower action.

(3) The two weeks delay which Captain Olds claims he overcame by use of a single flame thrower attack is explained in the official reports as due to reorganization of elements of the 43rd Division, which was in accord with observations I made at that time, knowing that Major General Hester was relieved of command and Major General John Hodge placed in command at that time.

(4) The Awards Section, Headquarters, SWPA has no record of having received any type of citation for Captain Olds or for any of the men who, he claims, participated in this action, although it would seem that if seven men overcame resistance which had stopped a complete regimental combat team for two weeks that such action would have been noted by somebody.

(5) I have discussed this action with several other officers who were in the vicinity at that time, and they likewise had never heard of the alleged action, as described in the *Chemical Warfare Service Quarterly.*

Therefore, I am inclined to believe that the account is somewhat exaggerated. While I do not doubt that the training was given to certain soldiers during this action and that they participated in the action, I believe that the extent of their participation was about the same in magnitude of effect as occurred in numerous other actions which occurred in New Georgia at about the same time. It is, therefore, recommended that this account as presently stated should be either omitted from future reports, modified to conform with probabilities, or definite documentary evidence obtained that the events occurred as described. I believe that other incidents which are less questionable could be used to illustrate the effectiveness of the weapon.

Assuring you that these comments are offered in the spirit of constructive criticism and interest in accuracy of your reports, I am

Sincerely yours,

NELSON MCKAIG, JR.,
Lt. Colonel, Cml. C. (USAF)
Chemical Officer
Academic Staff
The Air University

CAPT. GEORGE KATZ

CAPTAIN GEORGE KATZ AWARDED BRONZE STAR MEDAL

Captain George Katz of the 82d Chemical Battalion has been awarded the Bronze Star Medal for meritorious achievement in ground combat against the armed enemy from 13 to 14 September 1943 in the South Pacific Theater of Operations.

The citation which accompanied the award of the Bronze Star Medal reads as follows:

"You are commended for your resourcefulness and personal bravery in combat against the Japanese, September 13 and 14, 1943, at Arundel Island, British Solomon Islands. In order to provide better mortar fire support for our infantry engaged in driving Japanese from their last strongpoint in the New Georgia campaign, you daringly crossed an open lagoon under enemy sniper fire and moved your observation post forward more than 1,500 yards. From this position you were able to direct effective fire against obscure enemy positions and later in the day to destroy three enemy barges which were attempting to evacuate Japanese troops to Kolombangara Island. You set an example of coolness and determination which did much to bring about the complete destruction of the enemy."

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CREOSOTE
CRESOL—META PARA, ORTHO
2,4-DICHLOROPHENOXYACETIC ACID
DINITRO-ORTHOCRESOL
NAPHTHA, HEAVY SOLVENT
NAPHTHALENE
PARA AMINO PHENYL MERCURIC ACETATE
PHENOL
PHTHALIC ANHYDRIDE
PICOLINE—ALPHA, BETA AND GAMMA
PIPE LINE ENAMEL
PYRIDINE—MEDICINAL AND INDUSTRIAL
SODIUM CYANIDE
SODIUM THIOCYANATE
SULPHATE OF AMMONIA
SULPHURIC ACID—60°, 66° AND OLEUM
TAR ACID OIL DISINFECTANTS
TAR—CRUDE AND ROAD
TOLUOL—NITRATION AND COMMERCIAL
XYLOL—10°, 5° AND 3°

PITTSBURGH COKE & CHEMICAL CO.
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ITEMS FROM INDUSTRY

Cort Gets Post With Dennis Co.

Appointment of John S. Cort, Jr., as assistant to the president of Martin Dennis Co. of Newark and Kearny, N. J., was announced by A. L. Geisinger, president. The company, a subsidiary of Diamond Alkali Company, Cleveland, O., manufactures chromium chemicals.

Associated since early 1947 with the Cincinnati, O., plant operated by Diamond's Standard Silicate Division, Cort succeeds Charles E. Grant, who was promoted September 1 to the position of manager of chromium chemical sales for Diamond Alkali at Cleveland and transferred at that time to the company's general headquarters there.

DuPont Names Ammonia Aide

Appointment of Dr. Edward C. Kirkpatrick of 2302 McDonough Road, Wawaset Park, as assistant director of the chemical division of the DuPont Company's Ammonia Department, has been announced. He succeeds Dr. Robert L. Hershey, who recently became assistant general manager of the department.

Dr. Kirkpatrick, director of the nylon section of the department's chemical division since 1946, began working for DuPont in 1934 during summer vacations from college.

Kuhe Gets New Post With Ethyl

Harry Kuhe, who has been with Ethyl Corporation for 19 years, has been appointed manager of the chemical sales division, a new post with the company, it is announced. He will be in charge of sales of chemicals, except "Ethyl" antiknock compound, now being manufactured at the company's plant in Baton Rouge, La.

Hancock to Manage Diamond Unit

C. S. Hancock, on the sales staff of the Pure Calcium Products Division, Diamond Alkali Company, Painesville, O., since 1936, has been promoted to manager of calcium carbonate sales, it was announced at the company's general headquarters by Fred W. Fraley, vice president in charge of sales.

A native of Pittsburgh, Pa., Hancock joined Diamond at its Pittsburgh offices back in 1925. Shortly thereafter he was transferred to Painesville, O., where he was advanced to the post of treasurer of what was then known as the Pure Calcium Products Company.

The H. K. Ferguson Company Opens Chicago Office

A new sales office has been established in Chicago by The H. K. Ferguson Company, Industrial Engineers and Builders of Cleveland, it was announced by O. F. Sieder, executive vice president and general manager.

The office will be located at 120 S. LaSalle Street and will be managed by L. Douglas Lacy, formerly in the Ferguson Company's main office in Cleveland.

The office was opened to supply an increasing demand for industrial engineering and building services in the Chicago area, according to Mr. Sieder, who said that the Midwest is still the scene of significant industrial expansion.

Plunkett to Columbus Ad Staff

Appointment of James C. Plunkett as assistant advertising manager for the Columbia Chemical Division of Pittsburgh Plate Glass Company has been announced by W. I. Galliher, executive sales manager for the division.

Prior to his appointment with the Columbia Chemical Division, Mr. Plunkett edited the "Electrical Merchandising News," dealer publication of the Residential Sales Department, Duquesne Light Company, Pittsburgh, Pa.

A graduate of the University of Pittsburgh, Mr. Plunkett served with the Army's Signal Intelligence Service during the war years.

Smith and Gifford Take Mathieson Sales Posts

Henry Gifford has joined the Heavy Chemical Sales Division of Mathieson Chemical Corporation with headquarters in Chattanooga, and will cover Tennessee and adjoining states, it is announced by D. W. Drummond, Vice President-Manager of Sales. A native of South Carolina, Mr. Gifford received his B.S. degree from Clemson A. & M. College in 1935. Since then he has been affiliated with the chemical industry, particularly nitrogen fertilizer materials, and during the early part of World War II was employed by the Atmospheric Nitrogen Corporation. Prior to joining Mathieson, Mr. Gifford was on the sales staff of Allied Chemical and Dye Corporation.

Harry P. Smith, formerly New York District Sales Manager of Mathieson Chemical Corporation, has been made Assistant General Manager of Sales, it is announced by E. E. Routh, Vice President and Director of Sales. His headquarters will remain in the company's New York offices.

A native New Yorker, Mr. Smith graduated from Columbia with a B.S. degree in 1921. Prior to joining the Mathieson sales department in 1944, he was President of the George Chemical Company, now a division of Diamond Alkali Company. He is a member of the Chemical Salesmen's Association of New York and Alkali Distributors of the New York Metropolitan Area.

S. L. Nevins has joined Mathieson Chemical Corporation as general manager of the company's newly formed ammonia department, according to an announcement by Thomas S. Nichols, president and chairman of the board.

Taylor Takes Oak Ridge Course

Dr. J. David Taylor, a research scientist with Abbott Laboratories in North Chicago, Ill., is among the scientists attending a course this month at Oak Ridge, Tenn., on the techniques of using radioisotopes. The course is the fourth of a series of one-month courses offered by the Oak Ridge Institute of Nuclear Studies.

Van Wyck to Hercules Research Post

Dr. Peter Van Wyck, manager of the Virginia Cellulose Division of the Hercules Powder Company Experiment Station, has been appointed technical assistant to the Hercules director of research.

He will work on process development. Dr. Richard E. Chaddock, who has been handling technical assistance in this field, now will take over responsibility for technical assistance on sales development. He will serve as liaison between the sales development section of the department and the sales research division.

Dr. Arthur F. Martin will replace Dr. Van Wyck as manager of the Virginia Cellulose Division at the Experiment Station. He has served as chief chemist at the Virginia Cellulose plant in Hopewell, Va., for the past four years.

E. L. Jones, operating supervisor at the Hopewell plant, succeeds Dr. Martin as chief chemist of the plant.

Ruscoe Gets Goodyear Agency

Appointment of W. J. Ruscoe & Co., 2170 West Market Street, Akron, as distributors for Pliobond, an all-purpose adhesive, has been announced by the Chemical Division of the Goodyear Tire & Rubber Co.

Radiological Defense Class at Army Chemical Center, Md.

Forty officers and seven civilians are members of the Radiological Defense Class at the Chemical Corps School, Army Chemical Center, Maryland.

The students come from all branches of the Armed Forces and some from other government agencies including the Army, Navy, Air Force, Marine Corps, Coast Guard, U. S. Public Health Service and civilian employees of the Armed Forces.

The class director is Major Simon Kinsman, CmlC, and the class commander is Lt. Colonel Arthur G. Coulson, SigC.

The students reported to the school on the 8th of November and were welcomed by Colonel Geoffrey Marshall, Commandant of the Chemical Corps School.

Members of the class include: Major Allen H. Bouldin, CE; Commander John B. Brennan, Jr., USNR; 1st Lt. Alexander C. Bridewell, USAF; Captain James N. Brink, USAF; Captain William S. Callahan, USAF; 1st Lt. Cole Phipps, FA-Res; Captain James F. Dale, USAF; 1st Lt. Gerard H. Dath, USN; Captain Patrick H. Donahue, CmlC; 1st Lt. Luther W. Edmonds, Ord; Lt. Commander Malcolm G. Evans, USN; Major Joe Fishback, CmlC; Captain Samuel F. Freeland, USAF; CWO John P. Gautreau, USN; Lt. Commander James E. Hartung, USN; Lt. Commander Harold O. Hilmar, USN; Commander George W. Holtzmann, USCG; Ensign James D. Kearney, USN; Ensign Robert P. Metzger, USN; Captain John R. Thoman, USPHS; 1st Lt. Philip H. Fryberger, USAF; Major Richard K. Jacobson, USAF; 2nd Lt. Walter E. Johnson, USAF; Lt. Colonel Pierre A. Kleff, CmlC; Major Sanford Kommel, CmlC; 1st Lt. John H. Longbottom, CmlC; Lt. (jg) Karl O. Munringer, USN; Captain Verder McQueen, USAF; 1st Lt. Thomas R. Ostrom, MSC; Commander George A. Rezac, USN; Lt. Commander Jonathan F. Rice, USN; Lt. Commander Lynn G. Richaros, USN; Captain Theodore F. Schweitzer, SigC; Captain George B. Salmons, USAF; Commander William M. Snowden, USN; Lt. Walter W. Stevens, USN; Lt. Commander Walter M. Vincent, USN; Captain Charles L. Weaver, CmlC; Lt. Arthur R. Worley, Jr., USN, and Michael J. Blew, Thomas K. Kamalsky, William S. Kerr, John F. Gallagher, George W. Lanier, Frank G. Ort, and Raymond C. Pearson, civilians.

Chemical Center Seeks Personnel

Civil service examination for the position of Entomologist (Research), P-2 through P-6, $3720.20 to $7432.20 per annum, in the Federal Government, is now open.

This examination is being held by the Executive Secretary, Board of U. S. Civil Service Examiners, Army Chemical Center, Maryland, for probational appointment to positions in the Federal service at the Army Chemical Center, Maryland. Applications will be accepted by the Executive Secretary, Board of U. S. Civil Service Examiners, Army Chemical Center, Maryland, until further notice.

No written test is required. To qualify, applicants must have completed successfully a full four-year course in an accredited college or university leading to a bachelor's degree, with major study in entomology or zoology combined with courses in entomology, plus from one to three years' additional productive research experience in the field of entomology of such a nature as to show they are capable of performing the duties required.

V-2 Rocket and Technical Command

The satisfactory culmination of many months of coordinated effort on the part of engineers at the Technical Command, Army Chemical Center, Md., took place at White Sands, New Mexico, on 9 December 1948 with the firing of V-2 rocket No. 42 by the Army Ordnance Department for the Signal Corps.

One of the features of the rocket was a smoke generator installation which provided a new method of studying wind velocities in the upper atmosphere by means of visible smoke clouds. Standard FS solution (sulfur trioxide/chlorosulfonic acid) and water were used in the generator. The equipment was designed, constructed, installed, and serviced by experts from the Munitions Division, Technical Command. Personnel involved in the development and attending at White Sands, N. M., during the test included: H. E. Norton, Project Engineer; C. F. Novak, Design Engineer; F. E. Egner, Test Engineer; and John R. Bond.

During the test, which was highly successful, the rocket rose to an altitude of about 67 miles at a speed of 3,000 miles per hour. The smoke generator was equipped with a delay mechanism timed to function at 68 seconds after takeoff of the rocket. The generator emitted a stream of smoke at an altitude of from 20 to 40 miles. The smoke trails were clearly visible for 15 minutes. The movement of the smoke in the wind was photographed by cameras placed on the ground, and thus wind velocity was measured at a height of from 100,000 to 200,000 feet from the earth's surface.

Office of the Chief

1st Lt. George W. Connell of Abilene, Texas, ends a two-year tour in the Military Personnel Branch of the Chief's Office in April to go to Hawaii, where he will serve with the 14th Chemical Service Battalion under Colonel R. W. Breaks and Major T. C. Williams at Schofield Barracks, near Honolulu.

1st Lt. David A. Wilson, of Altadena, California, recently recalled to active duty to serve as Public Information Officer for the Chief's Office, is attending a fourteen-week course at the Armed Forces Information School at Carlisle Barracks, Pennsylvania.

Pine Bluff Arsenal Active

Many of those who had relations with Pine Bluff Arsenal during the war may wonder what has happened in the post-war years. They are doing all right. In fact, it looks as though they are doing a little better than all right, for in the past three years the Inspector General, Fourth Army, has rated the Arsenal and the Midwest Chemical Depot "superior."

At one time, employment reached a low of approximately 750, but it is currently running at about 1,250 in both the Arsenal and Depot. These are employed in keeping equipment in standby, maintaining war reserve equipment in storage, renovating munitions, and in the demilitarization of obsolete and Class "D" munitions. The Midwest Depot is operating as a fully active storage and issue depot. With the transfer of many of the stocks of Gulf Depot at Huntsville, Alabama, on its closing, the Midwest Depot handled approximately 60,000 tons of general supply, toxics and ammunitions over and above the normal workload. It was handled in stride and at a minimum cost per ton.

Pine Bluff Arsenal is presently renovating munitions to be used by the Air Corps in their expanding program. In addition, numerous items are being reconditioned and set aside for Organized Reserve Corps use. Other renovation crews are maintaining the stocks of material in Class "A" condition that would be required in the event of another emergency. Pine Bluff Arsenal has become the center of military activity in that general area, performing functions and services for the Army as well as Chemical Corps. The ordnance maintenance shops maintain vehicles of other components of the Armed Forces within a wide radius in areas adjacent to the Post. The Finance Office functions for the general area, and the office of the Reserve Instructor for the area is now occupying the former Depot Headquarters building.

On the occasion of the most recent superior rating, Colonel W. A. Copthorne, Commanding Officer, issued a commendatory statement to the military and civilian personnel, whose high standards of work, he stated, were responsible for the high rating received.

He said further, "The rating of superior should be particularly gratifying to all of us, since it is so seldom bestowed. The interest taken in your work and the accuracy with which it was performed reflect credit, not only on our installation and the Chemical Corps but upon the community. We can all take pride in being part of an outstanding organization."

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CHAPTER NEWS

Baltimore Chapter

Since the last issue of the Journal the Baltimore Chapter has had two very interesting meetings. On October 27 our meeting was spark plugged by Col. E. M. Hoshall, one of our members. His chief theme was radiological warfare, but of course he could give us only a general talk on it because of the necessary restrictions of military regulations. He did stress, however, that the Chemical Corps must be the nucleus of any civilian defense and that there is no time to waste in civilian organization. You would have enjoyed hearing him.

On December 8, we had a fine discussion on the Hopley Report—a copy of which we received from you in time to send out the announcements to our membership.

The consensus of those present was that the report is fundamentally acceptable with the exceptions and reservations that I shall briefly set out. We believe that the organization should be non-political, that the T.O. down through the Bn. Hq. should be staffed by qualified reserve officers not eligible for inactive duty training, that the organization should come directly under the Adjutant General of the state and that the State Guard should be the central unit to which all other units should be attached and not relegated to the lower echelon as it appears on Chart 3. We believe that the Bn. should be charged with the duty of future training and organization of civilian defense units. We finally determined that defense organizations should be particularly stressed in those areas where national need for the program is, firstly, most likely to arise—that is among the generally recognized ten most important states or cities.

A Merry Christmas and a Happy New Year to all of you from all of us.

JAMES H. PYLE,
Sec'y-Treasurer.

Chicago Chapter

Here we go again with notes from Chicago—Chicago, the city of "go" and filled with people who are going places, such as members of the Chicago Chapter. For example, they went down to the Coliseum during the exposition held by the American Chemical Society. Dr. Clifcorn of that organization extended the hand of fellowship and cooperation and made available to the chapter a choice spot to set up a booth. And the cooperation went right on from there. Mr. G. M. Glidden of the Acme Protection Equipment Co. loaned all sorts of decorative materials to make the booth "real pretty like." And the Fisher Process Co. sent along a lot of furniture to alleviate the aching feet of exhibitors and spectators alike. Local military agencies aided by providing additional furniture; a large sign depicting the emblem of the Armed Forces Chemical Association, and by making available trucks to haul chairs and tables and odds and ends. Mr. Bambery of the Patricia Stevens School of Modeling sent along a couple of lovelies—Lorrie Vales and Rita Le Grandeur.

Since Charley Glennon, Chapter President, has to work once in a while to earn coffee and cakes, and so could not be in constant attendance at the booth, the American Broadcasting Company cut a special transcription to be played on the public address system. In this, Captain Wagner introduced the president, who then told all about the Association and the advantages of being a member. National Secretary Jacobs sent along a sheaf of literature which was eagerly snatched up by the visiting firemen. Bob Innes, Chemical Editor of the Chicago Journal of Commerce, wrote a feature article that appeared in the special chemical edition of his paper.

The committee handling the affair was headed by Captain Leonard E. Wagner, and assisted actively by Mort Hague, Frank Marks, John Bruce, G. M. Glidden, Bill Cheney, N. E. Pentz, Ray Sabottka, Eddie Eaton and L. Tesseyman.

In addition to the gals from the Pat Stevens School, our own gals freely gave of their time. They were June Durkin, Dola Mohler, Mary Noell, Ramona Powless, Pat McGrane, Stephanie Vuchivich, Alvina Simmons, Maggie Rettberg, Laurie Manthi, Jeane Haag, Mary O'Brien, Alice Dineen and Viola Mohl.

The primary mission of setting up this booth was to provide a specialized section of the general public with a proper understanding of the Association. That this mission was accomplished was amply proven, for thirty-five new members came into the fold, and a marvelous mailing list was developed. This list will be used as another way in which to obtain even more members. And this whole affair was staged without worrying the Treasurer, Helen Tierney.

* * *

The serious business of the Chicago Chapter goes steadily on. At the last meeting, Lt. Col. Roy L. Muth, from the Office of the Chief, journeyed out to speak on the subject of the future of the Procurement Division. He followed the formal portion of the lecture with a question and answer period.

At this meeting, a special committee was appointed to develop policy for future meetings and functions of the chapter. Morton Hague, aided by Lou Capek and Preston Heller, are at work on this. They developed a postal card form of inquiry to determine the desires of all the members. This has a return portion with questions printed on it. All that must be done is to check a little box, sign the card, and drop in in the mail. Service is the keynote of the chapter.

GEORGE E. McELROY
Captain, CmlC
Director Public
Information
Chicago Chapter

Columbus Chapter

The October 19 meeting was held at Ohio State University. Dr. Conrad E. Ronneberg, Lt. Col. CC Res, spoke on "The Basis for Atomic Warfare." The members were keenly interested in this authoritative discourse and the following discussion went into the late hours.

A meeting is planned for January 25. The primary purpose will be to discuss the Civil Defense Program in which every member shall be expected to take an active part. The services of the Columbus Chapter have been proffered to and accepted by the state and city defense organizations.

Since it is assumed that our duties will fall within three categories, namely Radiological, Chemical and Special Weapons Defense, it is tentatively planned to appoint the best qualified member in each branch as a committee chairman. Their responsi-

bility, pending the activation of the state and city civil defense organizations, will be to become thoroughly familiar with the civil defense program, to receive and organize all available information in his field and stand ready to act in any capacity requested by the state or city organizations. Members living in outlying communities will be expected to volunteer their services to the mayors of their communities and call on the chapter for any advisory service or information needed.

The membership of this chapter is particularly qualified to be of service in this program, being well balanced between technical and operational personnel, with experience in all three branches.

DON C. MICHEAU,
President.

The following letter which accompanied the Columbus contribution is published as being of interest and importance—Editor.

Dear Sir:

Herewith the report of the Columbus Chapter. The first word I had of the Civil Defense Program was when it broke in the press. I immediately wrote to the Governor and Mayor volunteering our services and outlining our qualifications. Actually both offices are familiar with our organization and always send an observer to our meetings. The Mayor usually sends his Deputy Fire Chief and the Governor one of his personal staff.

This program, I hope, will provide our chapter with a needed shot in the arm.

What we need from National Headquarters is information. What material is there available on the latest defense measures against Chemical, Radiological and Biological attack? If such material is classified it should be the program of our organization to get some of it unclassified. If there are methods that might help us save our lives they should not be kept secret. I sincerely hope that something will be forthcoming in short order. This is important. We cannot figure out defense methods at chapter level.

Yours very truly,
DON C. MICHEAU.

Cleveland Chapter

The annual meeting of the Cleveland Chapter, A.F.C.A., was held at Brown's Restaurant, Friday, December 10, 1948. Elections resulted in the selection of the following officers for 1949:

Major Ralph S. Keller, President; G. G. Unkefer, 1st Vice President; D. J. Connelly, 2nd Vice President; Stan Elliott, Sec'y-Treasurer; G. F. Rugar, Director; L. C. Turnock, Jr., Director; Lt. Col. O. O. Kenworthy, Director.

Our speaker for the evening was Colonel Harry A. Kuhn, our National President, who spoke on "Civil Defense Planning." Colonel Kuhn pointed out the proposed organization of the Mobile Reserve Battalion, stating that Cleveland is to have two such units. The Cleveland Chapter plans to take an active interest in any planning contemplated for this section.

O. O. KENWORTHY.

Dallas Chapter

The Dallas Chapter, Armed Forces Chemical Association, held its November meeting on the evening of November 23rd at the Dallas Reserve Officers Club. In addition to members and their guests, all Chemical Corps Reserve Officers living in Dallas and vicinity were invited. Members were present from Tyler, Bonham, Ft. Worth and Dallas.

Our guest speaker was Lt. Col. Claude J. Merrill, Supply and Procurement Division, Office of the Chief, Chemical Corps. Colonel Merrill's talk covered the present status of procurement and procurement planning, with special emphasis on the selection and allocation of manufacturing facilities. This subject was particularly interesting due to the fact that a majority of our members were concerned with procurement work during the war. The Colonel was right at home in Texas with his 36th Division "T" patch.

It is our present plan to hold our meetings as regularly as possible, but to make their exact dates dependent on the availability of the speakers we want. This appears to be the key to a good turnout.

WM. W. TAGGART,
President.

European Chapter

While the chapter in the European Theater has been functioning since January 1948, an official approval for the organization of a chapter of the Association was just received from the theater commander on November 18, 1948. The present officers are: President, Lt. Col. Theodore P. Gahan; 1st Vice President, Capt. Clarence H. Colgin; 2nd Vice President, Major Robert E. Stoever; and Secretary-Treasurer, Captain Lawson H. Naler, Jr.

Excellent meetings were held at Weisbaden in September and at Chiemsee in November, which included everything from dinner-dances to wild boar hunts, as well as the business meeting. Guest speakers at the Chiemsee meeting included Lt. Col. Ralph Edmonds, Commanding Officer of Landsberg Air Force Ammunition Depot, who gave a stimulating and thought-provoking talk on airborne activities. Lt. Col. W. M. Fiske of the Chemical Warfare Board, Army Chemical Center, spoke on the techniques and use of the smoke generator which proved to be most interesting and valuable.

The next meeting, which will be the annual meeting, will be held on February 4, 1949. At this meeting the annual election of officers will take place. In addition to the four officers, five members of the Board of Directors will also be elected.

Japan Chapter

Chemical Section, General Headquarters, Far East Command, has initiated a policy of sending to all Chemical Corps officers in the Far East Command a monthly letter, the purpose of which is to keep these officers, regardless of their assignment, informed concerning new developments in their basic branch. Subjects covered include personnel, training, supply, new materiel and publications. Submitted herewith are extracts of these letters which may be of sufficient interest generally for publication in the Journal.

New arrivals in the Pacific area: Col. D. R. King, Maj. G. E. Danald, Maj. R. C. Hinckley, Maj. V. LaPiana, Capt. V. E. Dehner, Capt. W. L. Matheney, Capt. F. L. Olson, Lt. J. J. Bernard, Lt. R. T. Blow, Lt. D. R. Durkee, Lt. H. S. Fischgrund, Lt. T. A. Mitchell, Lt. F. A. Palacky, 2nd Lt. J. D. Freeble, 2nd Lt. N. E. Shoemaker.

Personnel who recently departed this area for return to Zone of Interior include: Col. G. Marshall, Col. T. H. Murphy, Lt. Col. C. B. Drennon, Jr., Lt. Col. J. W. Fitzpatrick, Capt. E. J. Johnson, Capt. J. J. Rogers, Capt. D. I. Saunders, Lt. C. L. Friar, Lt. W. A. Helwig, Lt. S. Richardson.

Maj. G. E. Danald has given four lectures of one and one-half hours' duration to about 1,300 officers in Yokohama area on defense against the new chemical and radioactive agents.

Lt. W. T. Carney, 90th Chemical Service Platoon, RYCOM, conducted a joint Army and Air Force Chemical

School. Two hundred graduates qualified as UGO's and UGNCO's.

J. A. PROUDE
Lt Col, CmlC
Executive Officer

New York Chapter

It was decided by the executive council of the New York Chapter that our first meeting must have something special. We had therefore decided to have a mixer at which time we would have an outstanding and prominent individual give us a short address. We had such a person lined up for the December meeting but unfortunately circumstances necessitated him canceling this engagement. It was therefore necessary to postpone the meeting until January 10th. At that meeting, additional plans will be made for having meetings in March and June with the Edgewood meeting some time in May.

CHARLES H. BRINKMANN.

Pine Bluff Chapter

Reference telegram 17 December 1948, no meeting held. Civil defense organization plan is sound and logical. This chapter will give full assistance and cooperation to state and community officials in case of devastating peacetime disasters as we have in the past.

WALTER J. MAYS.

Rocky Mountain Chapter

The annual meeting of Rocky Mountain Chapter was held on 14 December 1948. This meeting was a dinner meeting open to the members, their families and friends. The meeting was attended by a very enthusiastic crowd which was most gratifying to the officers.

The annual election of officers of the chapter was held. The following persons were elected as officers of the chapter for the coming year: Edward C. Thompson, President; Natale Boggio, Vice-President; Bernard C. Pittman, 2nd Vice-President; Jacquelyn M. Burgett, Secretary-Treasurer; Brig. Gen. Charles S. Shadle (Ret.), Major Russell Tegnell and Ray K. Easley, Board of Directors.

A most interesting talk was presented by Colonel Wendell W. Fertig, CE, about his experiences while organizing the guerrillas in the Philippine Islands during World War II. Colonel Fertig and his small staff were trapped behind Japanese lines for several years. His account of their experiences and the exceptional amount of ingenuity which was required for their survival was very interesting and instructive. Colonel Fertig is at present in charge of the ROTC Unit at the Colorado School of Mines in Golden, Colo.

K. C. CLIFTON.

Rochester Chapter

On October 30, 1948, a picnic was held for members of this chapter and their families. The event, an annual one, was as always highly successful.

A meeting is planned during the month of January at which time the Civil Defense Report will be discussed. Special emphasis will be given to the role of this chapter in helping formulate local chemical defense plans.

JAMES K. LITTWITZ,
Secretary.

Wilmington Chapter

The 1948 fall dinner meeting of the Wilmington Chapter was held at the Hotel Rodney on November 16. National Headquarters was represented by the President, Col. Harry A. Kuhn, and Col. Hepburn Chamberlain, both of whom gave short talks. Col. Kuhn discussed the objectives of the Association and described recently released plans for chemical civil defense and the position of the Association in these plans.

The principal speaker of the evening was Norman M. Lack, Brigadier General, O.R.C., whose topic was "Some Thought-Tickling Problems and Ideas for Research and Development." General Lack served as Chief of the Experimental Section of General Eisenhower's Staff at SHAEF in the European Theater of Operations. His talk was illustrated by moving pictures and his description of some of the last-minute changes and improvisations required preparatory to the great channel crossing operation were indeed thought-provoking.

The following officers were elected for 1949:

C. D. Pratt, President; H. S. McQuaid, 1st Vice President; R. E. Chaddock, 2nd Vice President; W. E. Catlin, Secretary-Treasurer.

The next meeting of the chapter will be held in January. Dr. Walter E. Lawson will discuss bomb damage in Japan and other items of interest in connection with his trip to that country.

WILLARD E. CATLIN,
Sec'y-Treasurer.

Edgewood Personnel Notes

LESLIE E. HERBERT, Chief, Design Branch, Engineering Division, Technical Command, Army Chemical Center, Md., is now assisting in the office of Sheppard T. Powell, consulting chemical engineer of Baltimore, Md., in addition to his duties at the Technical Command.

MRS. DORIS I. CABIN, formerly a chemist with Southern States Laboratories, Baltimore, Md., has joined the Editorial Branch, Technical Services Division, Technical Command, Army Chemical Center, Md., as a technical editor.

MILTON KURTZ has transferred from the Medical Division, Army Chemical Center, Md., to the Organic Branch, Chemical Division, Technical Command.

Medical Division Personnel Notes

Major Murdoch J. McLeod, CmlC—During World War II served with the 2nd Marine Division in Southwest, Central and Western Pacific. Upon release from active duty he took up his position as Information Specialist with the Bureau of Reclamation, Department of the Interior. He reported for active duty 17 September 1948 as acting chief of the Information Section.

Captain Charles A. Dutreau, CmlC—Reported for duty with the Gassing Section. During World War II he served as Instructor, War Department Civilian Protection School, Purdue University, Training Officer 6th Civilian Defense Region and Chief, Protection Branch, N. W. Sector, 9th Civilian Defense Region in Seattle, Washington.

Captain Hyman R. Gittes, CmlC—Reported for duty with the Toxicology Section. He served as Chemical Officer, Hampton Roads Port of Embarkation and later as Transport Commander during World War II.

Lt. Ogle B. Cope, CmlC—Reported for duty with the Toxicology Section. During the war he served with the 94th Cml Mortar Bn in the ETO. Later he served as adjutant of the 86th Cml Mortar Bn at Camp Campbell, Ky., and with the Filipino Scouts in the Philippines as security officer for the PHIB COM Cml A&R and I&E Depots. He attended Indiana University for 11 months prior to coming back on active duty 21 September 1948.

Lt. Jerome S. Brower, CmlC—Reported for duty with the Toxicology Section. During the war he served with the 8th Air Force in the ETO as Munitions Officer.

What's Doing

By Fred M. Jacobs
Secretary-Treasurer

The regular Executive Committee meeting of the Armed Forces Chemical Association was held on December 14 at National Headquarters with Colonel Harry A. Kuhn, President, presiding. This meeting was most interesting, informative and productive of exceptionally good results. There were twenty members present, including members of committees and deputies.

One of the most interesting matters concerned the report of Dr. Lawson's committee on the recommendations for medals and awards. After much deliberation a motion was passed which decided on the medals to be awarded outstanding R.O.T.C. and Edgewood summer school students. The bar and scroll were also submitted and approved, and pictures will appear in the April issue of the Journal. Both of these awards were described on page 3 of the November News. A sketch of the plastic wood plaque to be used for group members, individuals responsible for 10 new members, outstanding members, national officers and the retiring Editor, Col. Rodier, was presented. It was proposed and approved that the seal for the medal be adopted as the official seal of the Association and be used for the scrolls, which will be appropriately phrased. Great credit is due Dr. Lawson and his committee for their fine work. Dr. Lawson accepted for the Committee the responsibility of carrying this program through to completion.

The financial report was given by Mr. Mery, which was followed by Mr. Norman's account on the investments of the fixed reserve fund, which have shown practically no less, notwithstanding the unsettled condition of the stock market.

The following additional group members were reported: B. F. Goodrich Chemical Company, Merck & Company, Stewart Die Casting Company and Sherwin-Williams Company. More of these "Minutemen" are needed to further the activities of the Association, and an earnest request of the Directors-at-Large will be made for their action.

Mr. Jacobs called to the attention of the Executive Committee the wonderful cooperation that has been received from the Military Personnel Branch of the Chief's Office, which has been invaluable.

Although the suggestion has been made that the membership drive be continued beyond January 1, the extra credit allowed the chapters for memberships obtained will not be extended past that date. Mr. Jacobs stated that the Army Chemical Center Chapter has reported the total of 82 new or pledged applications.

A meeting was planned for the Washington, D. C. Chapter and Colonel Chamberlain accepted Colonel King's invitation to assist in the planning of this meeting.

Mr. Leggin gave the Publication Committee's recommendation for a successor to Colonel Rodier, which had been pending since his resignation as Editor in August. Mr. MacArthur H. Manchester, who is now the Editor of the Reserve Officer Magazine, was appointed to edit our Journal, in addition to his present editorial post. He is a former newspaper man, was public relations man under General Patton during the war and has gained a wide reputation as the Editor of the Reserve Officer.

In accordance with the action taken at the last meeting, an agreement has been signed with Woolf and Elofson as advertising representatives for the Journal for a period of two years beginning January 1, 1949. Mr. Elofson was introduced and reported on his plans and policies for the advertising in our publication.

The acceptance of Mr. Rogers' formal resignation as Assistant Treasurer, which was announced in September, was passed. Mr. Jacobs suggested that Miss Gross be appointed to fill the vacancy and this was passed unanimously.

With the approval of the committee, Colonel Kuhn will send an invitation to the Technical Officers' Association of England to have two or more of their representatives at our Annual Meeting. This is the same Association which has invited our representation at their meeting in Porton, England, in September.

Colonel Kuhn asked that the Committee for Meetings and Conventions present a tentative date and program for the Annual Meeting at the next Executive Committee Meeting on January 25.

The request by Colonel Loucks for a charter for the European Chapter was presented. The Secretary will obtain a charter for this chapter in view of the fact that it is necessary for their operation in that theatre.

It is interesting to note that the National Security Resources Board considered that the Journal is the best mouthpiece for their releases on chemical mobilization planning. The Board will therefore try to prepare its releases to appear in the Journal. In the meantime it must be the function of the Association to hold in preparedness the nucleus of people with the "knowhow" in this field.

A most interesting talk was given by Colonel Benner, Chief of the Military Personnel Branch, who represented the Chief's Office at the meeting. He made many suggestions which will be given careful consideration. He stressed again the importance of holding together for the future the fund of knowledge acquired during the last war, so that all members concerned will be up-to-date on chemical activities when called upon.

The possibility of a Chemical Warfare Day, to compare with Industry-Army Day was suggested and held for future consideration.

The meeting was adjourned at 11:45.

Office of The Chief

Major General Alden H. Waitt's Division Chief surprised him Wednesday afternoon with an informal birthday celebration, complete with a fifty-six candle cake.

Lt. Colonel Clifford P. Holm of New Effington, South Dakota, recently returned from China and is now working under Colonel Leonard J. Greeley, Assistant Deputy Chief for Management, in the Office of the Chief. In Nanking Colonel Holm served with the Army Advisory Group as Senior Advisor on Service Plans and Operations for the Combined Service Forces. Three Chinese decorations were awarded the Colonel during his recent overseas tour.

Major Alton L. Robbins of Arlington, Virginia, recently assigned to the Procurement Branch, Supply and Procurement Division, Office of the Chief, has left Washington for Japan. Major Robbins spent three years in the Control Division, Statistical Control Branch, during World War II, returning to a civilian status in July, 1946 to work for the War Assets Administration until his recall to active duty on 23 August.

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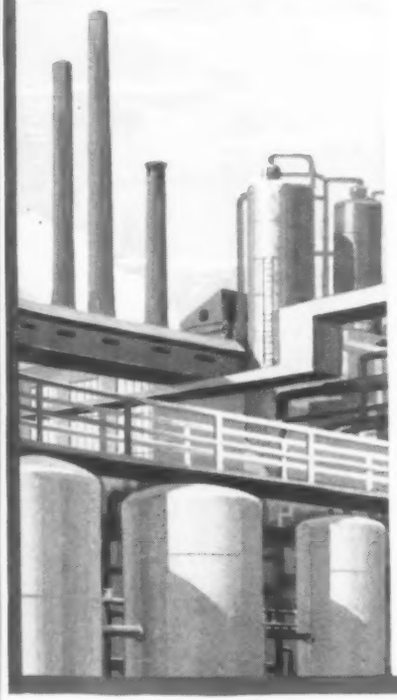

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Supplement

Armed Forces Chemical Journal

Vol. III January 1949 No. 3

APPENDIX TO MEMBERSHIP DIRECTORY

INSTRUCTIONS

Remove this section and place in Directory over page 44.

Using scotch tape bind this supplement into the Directory at this point. If taped at the front and the back it will hold the supplement securely in place.

Cross out names on page 45. These names included in supplement.

This supplement brings your Directory up-to-date as of December 31, 1948.

ADDITIONAL GROUP MEMBERS

B. F. Goodrich Chemical Company, Cleveland, Ohio
Merck & Company, Rahway, N. J.
Sherwin-Williams Company, Cleveland, Ohio
Stewart Die Casting Company, Chicago, Illinois

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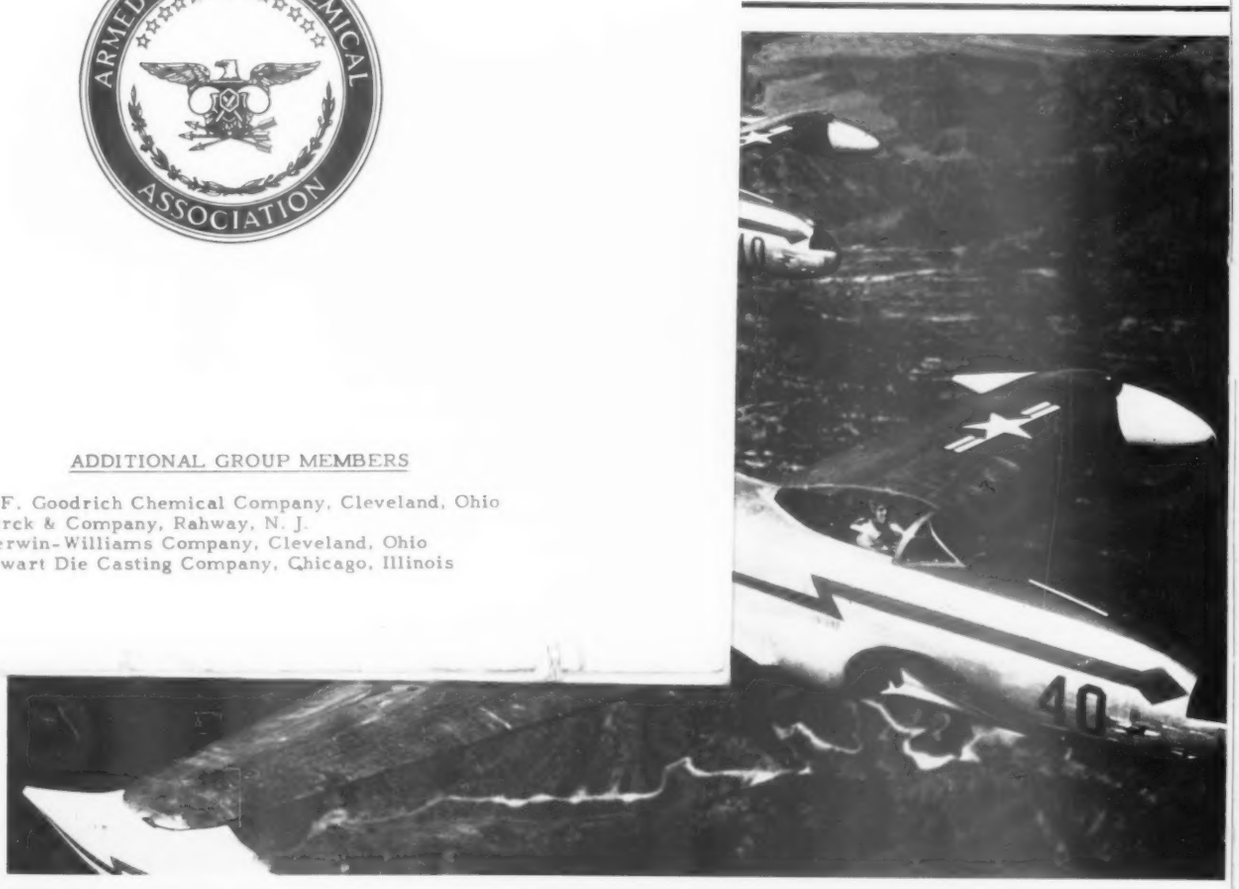

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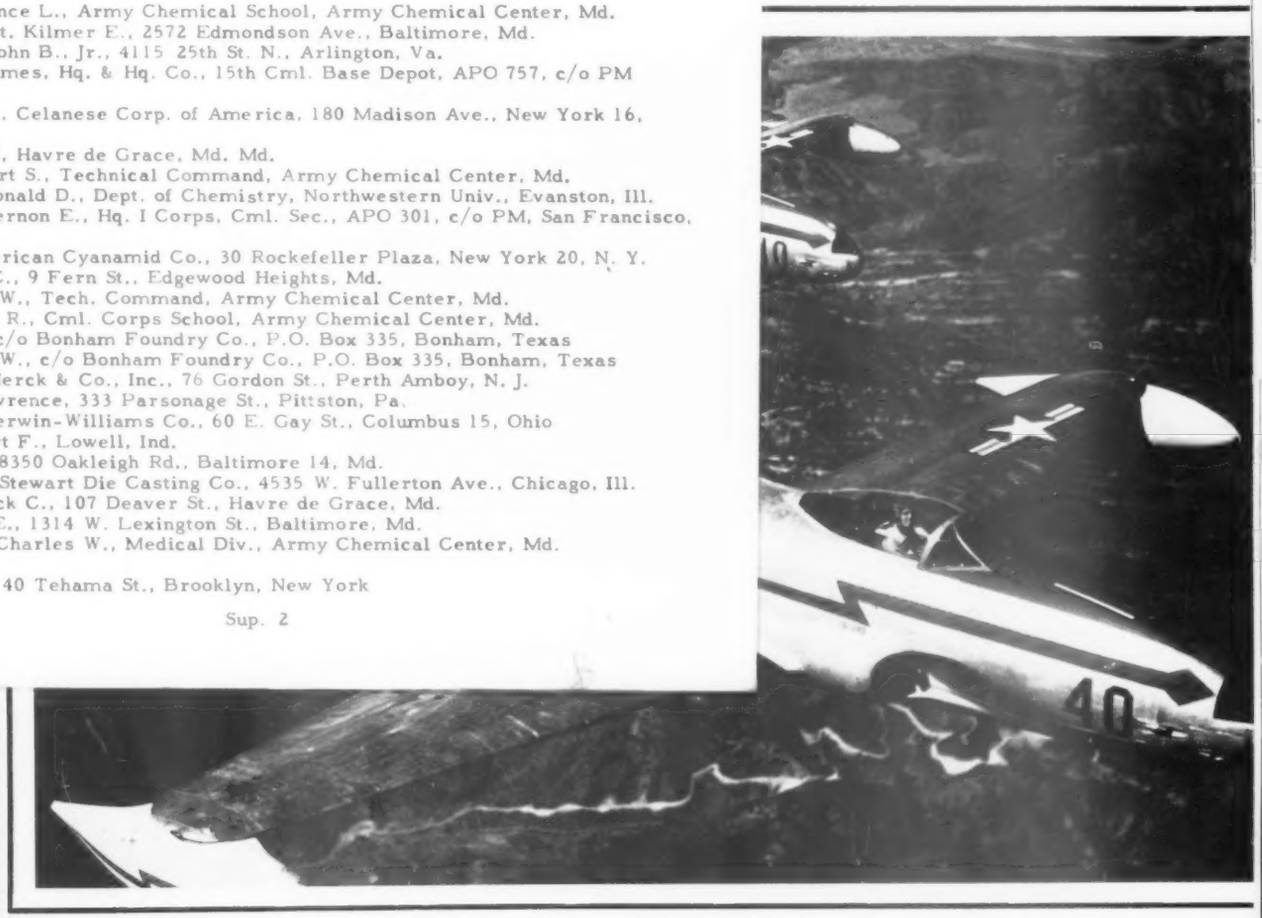

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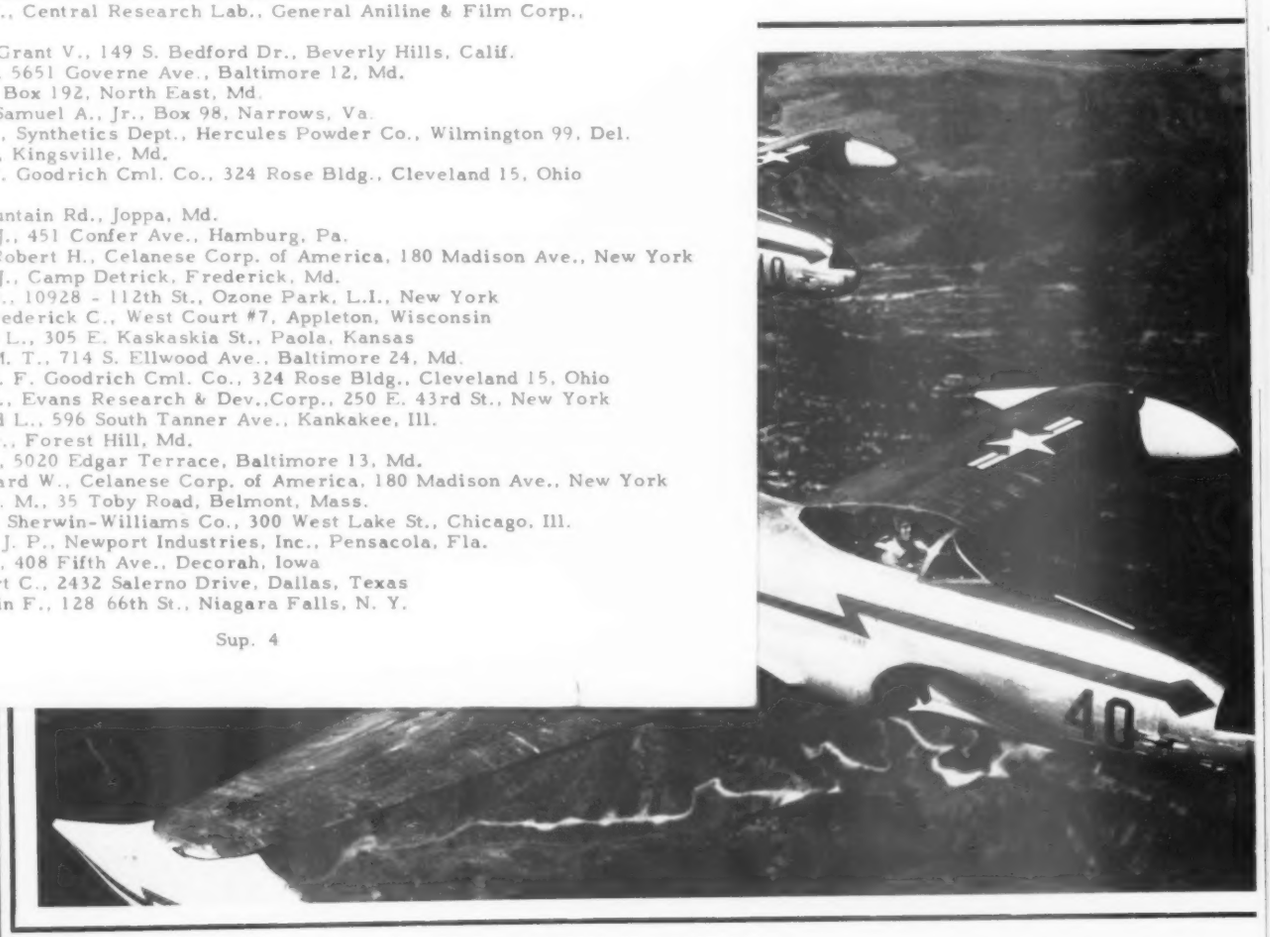

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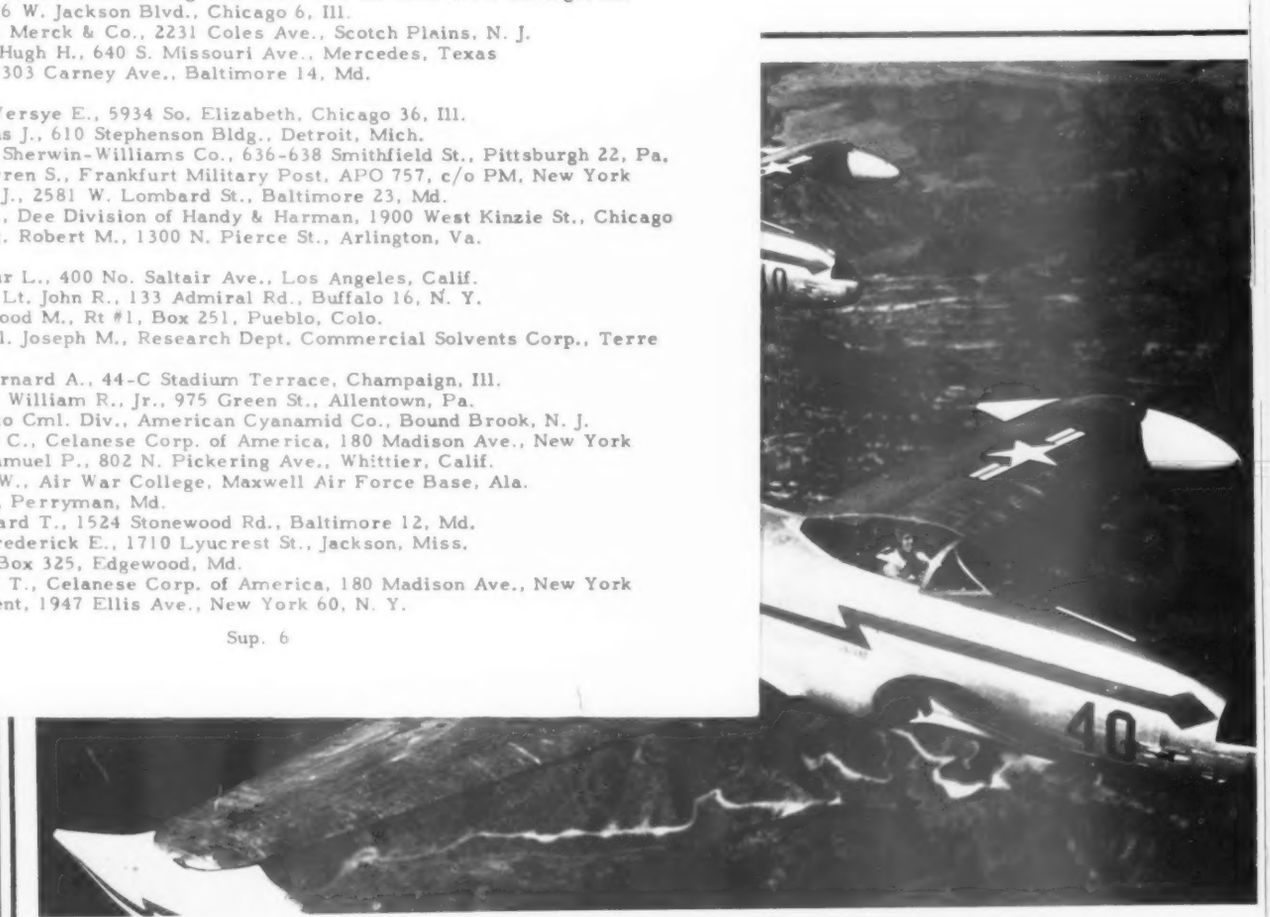

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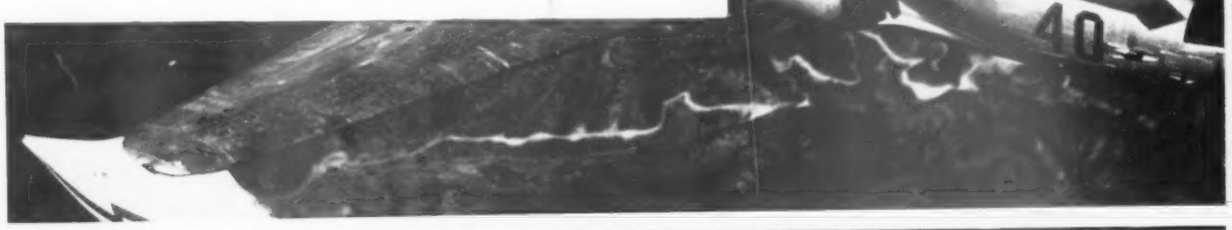

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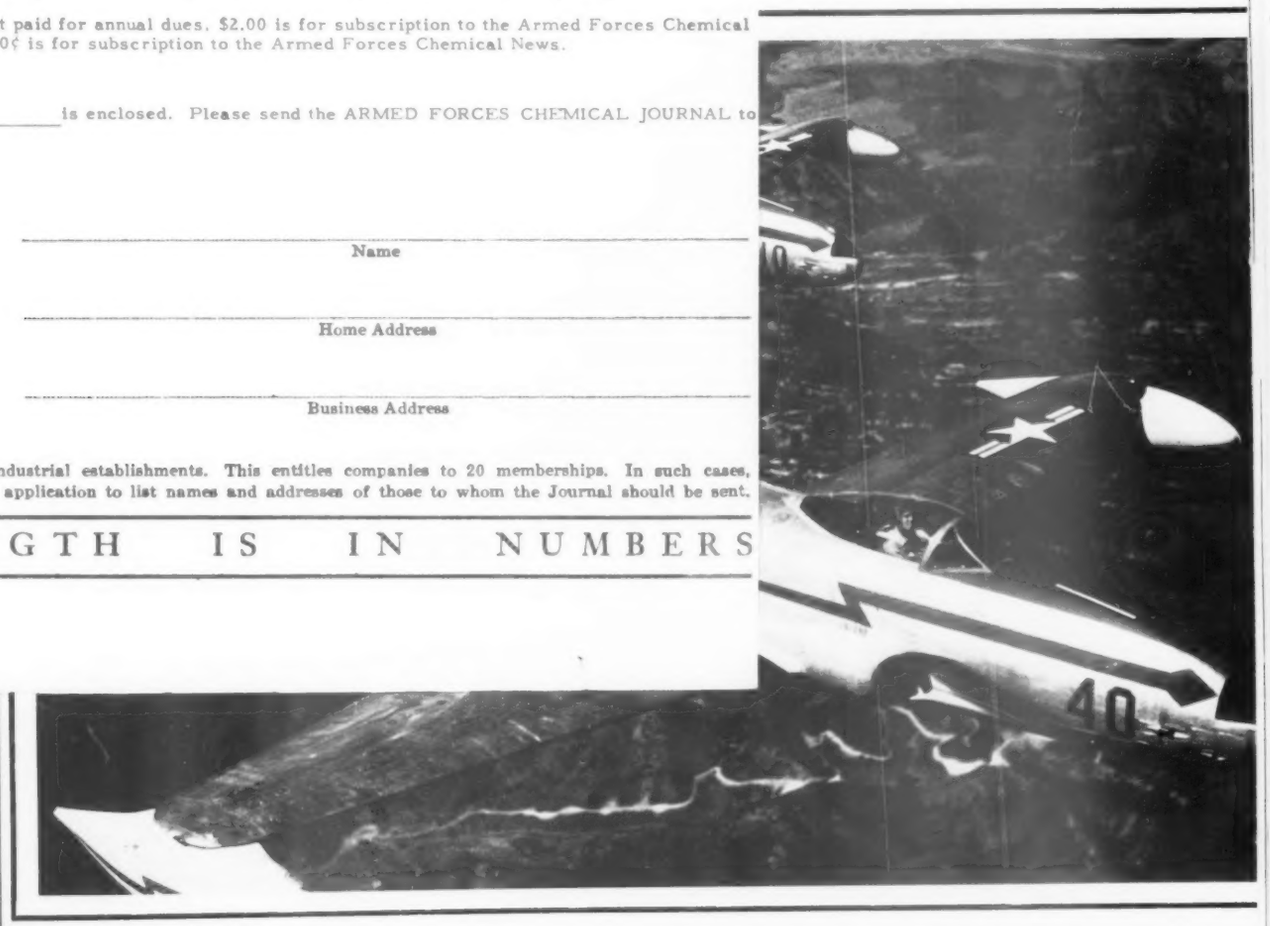

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